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SIEMENS S-70 TRUCK OVERHAUL

RFP # 269-2019-776
TECHNICAL SPECIFICATION SCOPE OF WORK
EXHIBIT A

CHARLOTTE SM

CATS CHARLOTTE AREA TRANSIT SYSTEM

CITY OF CHARLOTTE
NORTH CAROLINA

NOVEMBER 14, 2019

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REVISION HISTORY

Revision Number	Revision Date	Revised sections	Description, Reason for changes
1.0	November 14, 2019	-	Initial Release

1 PURPOSE

This Technical Specification document details the requirements of the Charlotte Area Transit System (CATS), herein known as the City, for the 600,000 mile/10-year overhaul of its CATS I & II Light Rail Vehicle powered truck, powered truck bolster, center truck, and specified car body mounted components.

2 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

2.1 Definitions

Whenever in the Specification the words "acceptable", "accepted", "approval", "approved", "authorized", "condemned", "considered-necessary", "deemed necessary", "designated", "determined", "directed", "disapproved", "established", "given", "indicated", "insufficient", "ordered", "permitted", "rejected", "required", "reserved", "satisfactory", "unacceptable", "unsatisfactory", or words of like import are used, it shall be understood as if such words were followed by the words in writing, "by the City" or "to the City", unless otherwise specifically stated.

Wherever the word "indicated" is used, it shall be understood to mean "as described in the Specification" or "as required by the other Contract Documents."

Wherever the words "provided", "supplied", or "installed" are used in the Specifications in reference to work to be performed by the Contractor, it shall be understood to mean "furnished and delivered completed".

The definitions listed below are in addition to those included in Volume 1 – Commercial Provisions.

Acceptance: (As applied to design information, technical documentation or similar intellectual property) Reviewed for conformity to Specification and accepted, in writing, by the City. See Section 10.4 for additional information.

Accepted Equal: Whenever the words "accepted equal" or "equal" are used in connection with material or equipment, the proposed alternative shall be functionally compatible with and of equal or better quality than the item it is proposed to replace. The City's decision as to whether any material or equipment proposed is equal to that specified shall be binding on both the City and Contractor.

Approval: Review and acceptance in writing by CATS. See Section 10.4 for additional information. Approved Equal: See Accepted Equal.

Baseline Design: The design of the truck or any of its components, apparatus, systems, sub-systems, or materials which has received both design review approval and first article approval by CATS.

Burn-In: An operational test conducted by the Contractor after all other tests are successfully completed.

Design/Fabricate: Shall mean design, analysis, fabrication, installation, and testing of a new component/assembly. City approval is required for all design documentation, analysis and test procedures and reports, and installation procedures prior to commencing with the applicable task.

End Product: The Contract item(s) furnished by the Contractor in accordance with the Contract Documents. End Product(s) includes, but is not limited to, trucks, bolsters, drawings, specifications, instructions, books, education programs, spare parts, and services.

Equal: See Accepted Equal.

Final Assembly: Installation and interconnections of the brake equipment, motors, brackets, wheels and axles, suspensions, frames, and all components required to meet the requirements of the End Products; the inspection and verification that all installation and interconnections work; and the testing in-plant of the stationary product to verify all functions.

First Article Acceptance: The examination and approval by the City of an initial part, assembly, subassembly, system, subsystem, apparatus, or material, manufactured or assembled by either the Contractor or Subcontractors. The First Article Approval establishes the baseline design and the minimum level of quality. Although the exercise of First Article Approval shall be at the City's option, the contractor shall assume that the City will subject all of the above to first article examination and approval.

First Article Inspection (FAI): An extraordinary inspection of a First Article which accomplishes two purposes. First, it permits the City to see, in three dimensions, what could be seen only on two dimensional drawings up to that point. If the First Article Inspection is of a component that the Contractor is purchasing, rather than making itself, the First Article Inspection discloses details that were not visible beforehand. The First Article Inspection is usually the first point at which maintainability of the component can be evaluated, inasmuch as it is the first point at which relationships between elements can be appreciated. The City may approve the design that is revealed at the First Article Inspection, or may require changes in order that the component can meet the requirements of the Contract. Second, it is used to establish the quality level of workmanship that will be maintained for the balance of the components. The level is established jointly by the City and the Contractor.

Hidden Damage: Repairs or replacement components required that are not otherwise covered within the base scope of work as defined by this Technical Specification. The Contractor shall only proceed with corrective action for hidden damage upon receipt of written approval from the City. See Section 4.3.

Independent Failure: A failure which is not the result of another failure, either directly or indirectly.

Inspect: Shall mean cleaning, inspection, painting, and related processes, such as measurements and tests, as defined in this Specification.

Inspector: A person or firm designated by CATS as its quality assurance representative.

Interface: The points where two or more systems, subsystems or structures meet, transfer energy, or transfer information.

Material (Supplies): Any substances used in the overhaul of the End Products(s) or furnished to the City as part of the Procurement.

Nonconforming: The inspection or test result(s) fails to conform or comply with the Contract or Specification requirements.

Notice: A written announcement.

Original Equipment Manufacturer(s): The original manufacturer of the End Products, components, or assemblies.

Overhaul: Shall mean the restoration of a component to equal the performance, service life, and appearance of that new component through inspection, testing, replacement of worn and damaged parts, adjustment, cleaning, refinishing, repair of any damage, and any other rehabilitation work required.

Pre-Shipment Inspection: Source Inspection of product, parts, components, subsystems, or systems conducted immediately prior to releasing items for shipment to Contractor or other destination.

Procurement (Work): The furnishing of all equipment, items, materials, parts, systems, data, design, services, incidentals, labor, management, and performance of the requirements defined in the Contract Documents, including changes thereto, in order to produce and deliver the specified End Product(s).

Program: The total effort undertaken by the City of which the End Products may constitute a whole or a part.

Qualify: As used in these Specifications shall be the determination that an assembly, sub-assembly, or any part thereof is satisfactory for continued service under the Contractor's warranty, or that the time is suitable for repair or overhaul to restore it to warrantable service, or that the item must be replaced with a new (or warrantable rebuilt) part.

Ready-to-Run: The End Product is in a state to install in a revenue vehicle and function as intended by the OEM and Technical Specifications.

Rejectable: See Nonconforming.

Related Defect: Damage inflicted on any component or subsystem as a direct result of a defect.

Reliability: The probability of performing a specified function without failure and within design parameters, for the period of time specified, under actual operating conditions.

Repair: Shall mean fixing specific damage following procedures and acceptance criteria outlined by this Specification and approved by the City. Repaired components/assemblies shall be within tolerances for new equipment, unless otherwise approved by the City.

Repair as Necessary: Shall mean repairs of an existing component/assembly necessary to return the component/assembly to like-new condition, when the component is found by the Contractor to be nonconforming based on the specified City Approved inspections and/or tests.

Replace: Shall mean installation of a new OEM component/assembly or a new component/assembly meeting the OEM requirements, as specified, on all trucks and bolsters.

Replace as Necessary: Shall mean installation of a new OEM component/assembly or a new component/assembly meeting the OEM requirements, as specified, when the existing component/assembly is found to be nonconforming based on the specified inspections and/or tests.

Safe: The condition in which passengers, crew, or maintainers are secure from threat of danger, harm, or loss arising from improper design, manufacture, assembly, malfunction, or failure of the End Product or any of its components or systems.

Service Proven or Proven: The historical success of that equipment operating under similar conditions on other transit vehicles and has achieved a MDBF (Mean Distance Between Failures) consistent with the City’s requirements.

Service, As In Service Use, Service Braking, Revenue Service: The operation of the End Products under normal conditions.

Shipment: The physical process of transporting the End Product and associated components, or other required physical deliverable item, from the point of manufacture, overhaul, or assembly to the next manufacturing, overhaul, or assembly facility, or to CATS property.

Source Inspection: Inspection conducted at the source of the product (generally Subcontractor/Supplier). May include the FAI, or may be performed as part of an investigation or audit.

Traction System: The system of wheels, motors, gearboxes, brakes, direct controls and appurtenances that propels or retards a vehicle in response to control signals.

Tram: A condition of ideal truck geometry in which the axles are perfectly parallel and the wheels in perfect lateral alignment. The centers of the journal bearings represent the corners of a rectangle. Tram is checked by measuring the diagonal and longitudinal distances between reference points on the journal bearing housings and truck frame pedestals.

Vehicle: CATS I/II Light Rail Vehicle.

Vendor: See Supplier.

2.2 Acronyms and Abbreviations

Wherever the following abbreviations are used in these Contract Documents or on the Plans, they are to be construed the same as the respective expressions represented:

AAR	Association of American Railroads
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
ASQ	American Society for Quality
ASTM	American Society of Testing and Materials
AWO	Empty Vehicle, Ready-to-Run Weight
AWG	American Wire Gauge
AWS	American Welding Society
CAD	Computer Aided Design
CAP	Corrective Action Plan
CDRL	Contract Deliverable
EHU	Electro-Hydraulic Unit
°F	Degrees Fahrenheit
FAA	Federal Aviation Administration
FAI	First Article Inspection
FDR	Final Design Review
FTA	Federal Transit Administration
FCAW	Flux Core Arc Welding

GMAW	Gas Metal Arc Welding
HAZ	Heat Affected Zone
HRM	Heavy Repair Manual
Hz	Hertz
ID	Inner Diameter
IEC	International Electrotechnical Committee
IEEE	Institute of Electrical and Electronic Engineers
IPC	Illustrated Parts Catalog
ISO	International Standards Organization
LRV	Light Rail Vehicle
MDBF	Mean Distance Between Failures
MPI	Magnetic Particle Inspection
NACE	National Association of Corrosion Engineers
NCR	Nonconforming Materials Report
NDT	Non-Destructive Testing
NFPA	National Fire Protection Association
NTP	Notice to Proceed
OD	Outer Diameter
OEM	Original Equipment Manufacturer
PDR	Preliminary Design Review
P/N	Part Number
PQA	Project Quality Assurance Plan
PQR	[Weld} Procedure Qualification Record
PSI	Pounds per Square Inch
PT	Dye Penetrant Inspection
RMS	Root Mean Square
RMS	Running Maintenance and Service Manual
SMAW	Shielded Metal Arc Welding
SSPC	Society for Protective Coatings
TTIR	Total Indicated Runout
TS	Technical Specification
UT	Ultrasonic Inspection
V	Volts
Vdc	Volts Direct Current
VPI	Vacuum Pressure Impregnation

VT	Visual Inspection
WPS	Weld Procedure Specification
WQTR	Welder Qualification Test Record

3 DESCRIPTION OF ASSEMBLIES

The CATS I & II Light Rail Vehicles are equipped with three trucks (two Powered Trucks and one Center Truck). The trucks, equipped with primary and secondary Suspension Systems, support the vehicle loads and provide a comfortable ride for passengers. The two Powered Trucks “A” and “B”, equipped with traction motors, are located under the related vehicle section, while the Center Truck “C” is located under the center section. Further description of the assemblies is provided below and within the LRV Maintenance Manuals which are included in Section 12.

3.1 Powered Truck and Bolster

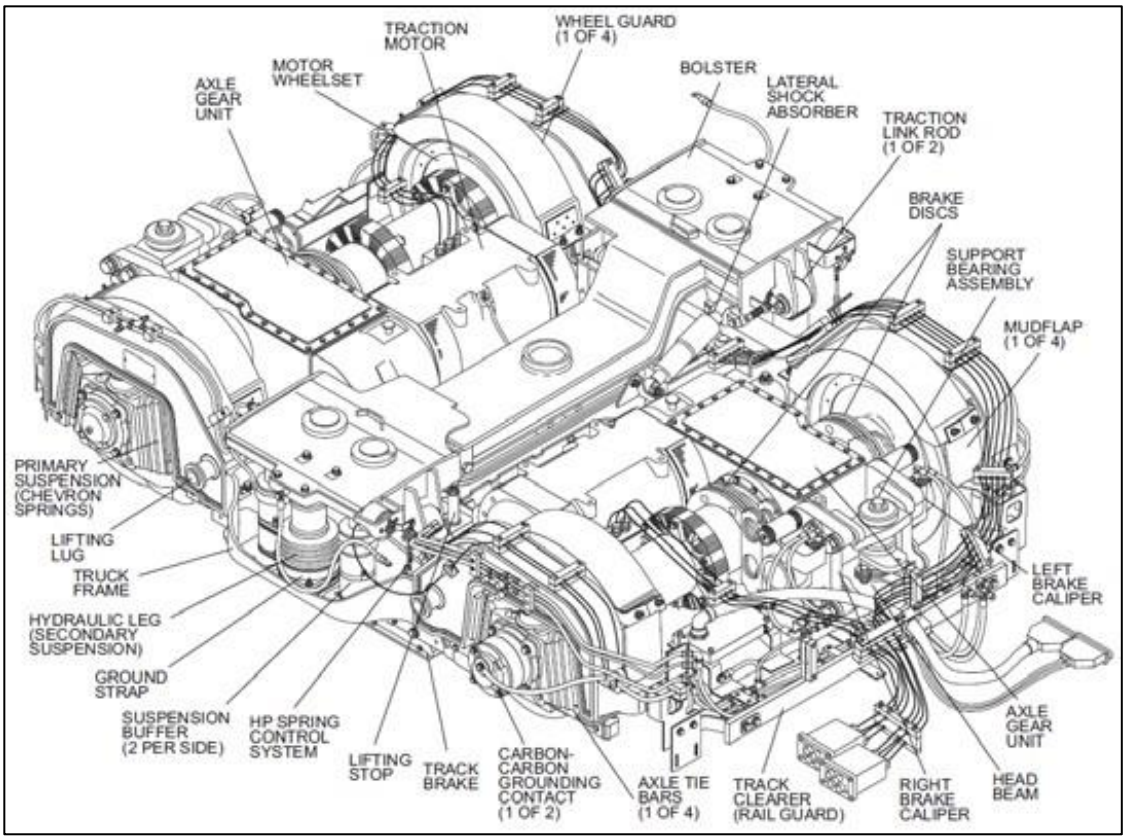
The Powered Truck main components include: Truck Frame, Bolster, Primary Suspension, Secondary Suspension, Wheel Sets, Traction Motors, Axle Gear Units, Brakes/Hydraulic System, Track Brakes, Rail Clearer, and Traction Link Rod.

Additionally, the following components that are mounted to the car body are within the overhaul scope: Electro-Hydraulic Unit (EHU), Hydraulic Hoses, Brake Accumulators, Hand Pump, Bolster Ring, and Bolster Center Pin.

Each Powered Truck is equipped with items that are components of other vehicle systems as follows:

- Propulsion System: Traction Motor Units, Ground Brushes and Gear Units.
- Hydraulic Brake & Suspension System: Brake Disks, Brake Calipers, Track Brake, Suspension Leg.
- Sanding System: Sanding Nozzles.
- ATP: Receiver Coils.

Figure 1: Powered Truck and Bolster Assembly



3.2 Center Truck

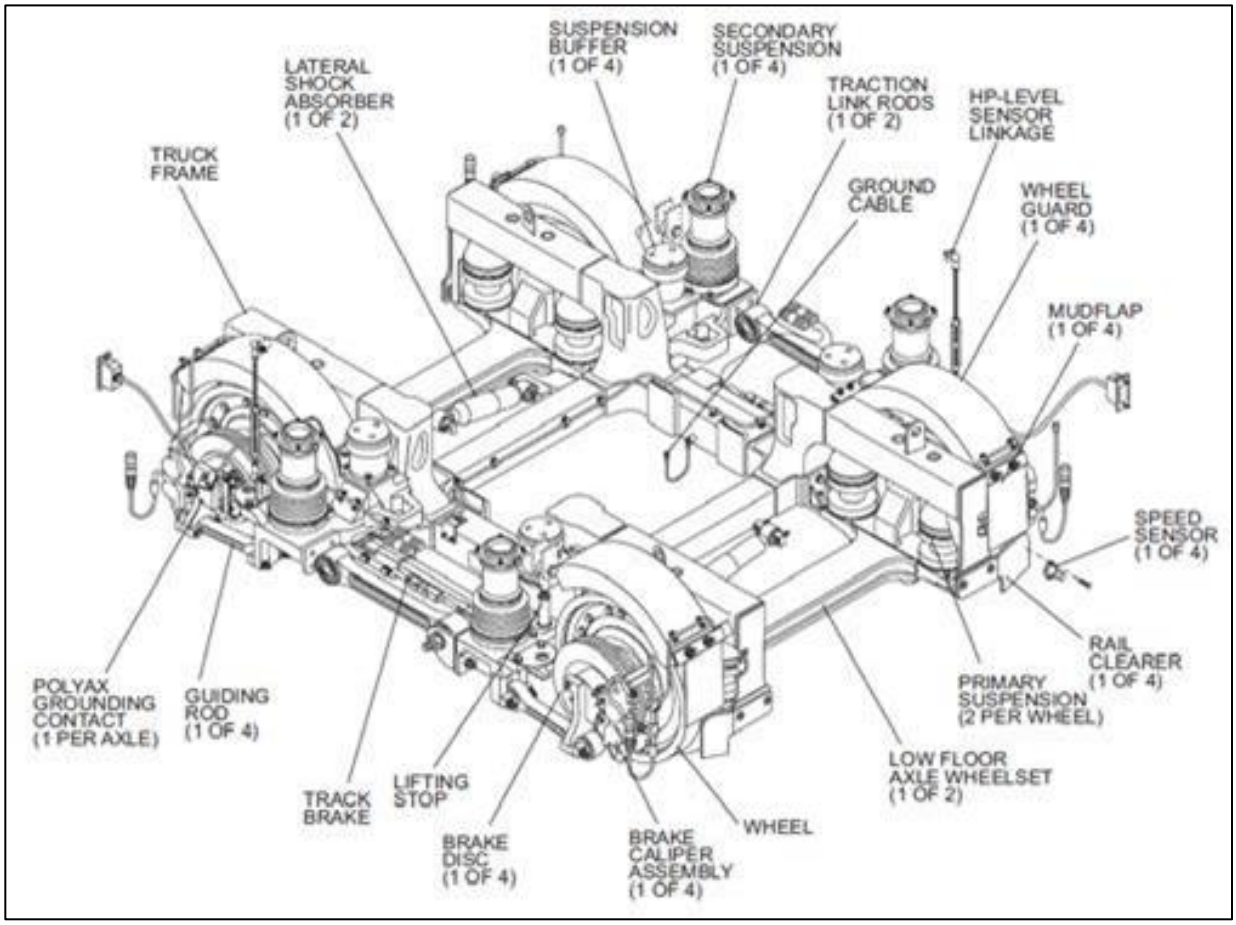
The Center Truck main components include: Truck Frame, Primary Suspension, Secondary Suspension, Wheel Set, and Brakes/Hydraulic System.

Additionally, the following components that are mounted to the car body are within the overhaul scope: Electro-Hydraulic Unit, Hydraulic Hoses, Brake Accumulators, Level Sensor, and Selector Valve.

The Center Truck is equipped with items pertaining to the following vehicle systems:

- Propulsion System: Speed Sensors.
- Hydraulic Brake & Suspension System: Brake Disks, Brake Calipers, Track Brake, Suspension Leg.

Figure 2: Center Truck Assembly



4 GENERAL REQUIREMENTS

4.1 Contractor Responsibilities

The overhaul shall include complete disassembly of the powered truck, center truck, and powered truck bolster assemblies into their component parts and/or subassemblies. The overhaul shall include cleaning, inspection, repair, replacement, painting, lubrication, calibration, adjustment, testing, reassembly, and all other work required to produce complete and functional powered truck/bolster and center truck assemblies meeting the requirements of this Specification.

The overhaul of spare components must meet the technical requirements of this specification for that component and all other requirements specific to this contract.

The Contractor shall replace all hardware, electrical cables, wiring, hoses, hose fittings and quick disconnects, and elastomeric components that are removed as part of the truck overhaul with new components meeting the OEM requirements, except as otherwise required by this Specification.

The Contractor shall clean and protect all component identification labels or decals from damage during overhaul.

The Contractor shall properly mark all wiring and hoses disconnected in the process of the overhaul in accordance with the OEM schematic diagram, as approved by the City.

The Contractor shall be responsible for developing technical requirements for City review and approval where technical information, such as dimensions, tolerances, material, manufacturing/assembly process, heat treatment, finishing, corrosion protection, and inspection, are missing from the OEM drawings.

- The Contractor may need to develop other technical information; the list above is not exhaustive.
- The City does not certify or guarantee the accuracy of the OEM drawings or other documentation. The Contractor is responsible for confirming that the information provided in OEM drawings and documents is correct and reasonable for this application. The Contractor shall apply in writing to the City any questions or concerns about the accuracy of information in the OEM drawings or documents and shall adhere to the City's written response.

4.2 Base Scope of Work

CATS understands over the course of this program trucks will enter the program that may be damaged and require repairs beyond the base scope of work provided in this Specification. These repairs will be identified as Hidden Damage. Requirements for Hidden Damage repairs are provided in Section 4.3.

The Contractor shall furnish all engineering, testing, management, labor, materials, tools, incidentals, and all other items required to complete the specified work.

The Contractor shall be responsible for all logistics and costs associated with transportation between CATS's shops, the Contractor's facility, and any Subcontractors' facilities.

The Contractor shall be responsible for developing, procuring, maintaining, and calibrating all tools and test equipment necessary to ensure that the requirements are met. Calibration requirements for measurement tools and test equipment are provided in Section 9.4.

The Contractor shall perform all overhaul and repair work, inspections, and tests using written work instructions submitted to and approved by the City in accordance with Section 10.2.

- Work instructions must identify all tools and test equipment used in the performance of the work.
- At a minimum, all tests and inspections required by the OEM documentation and this Specification must be performed. The Contractor shall be responsible for performing additional tests and inspections as necessary to ensure proper interfaces and functionality of the trucks.

Both before and after overhaul, records must be kept of all inspection and testing results. The Contractor shall include all in-process inspections and tests, the receiving inspection, pre-shipment inspection, and first article inspection defined in Section 9.10.

- The Contractor shall include all inspection and testing records in the Truck History Books provided by the Contractor per Section 10.10.

The Contractor shall record all nonconforming materials identified by the Contractor on a Nonconforming Materials Report (NCR) per Section 9.11.

- The Contractor shall include all NCRs in the Truck History Books provided by the Contractor per Section 10.10.

The manufacturer, model, revision level, and serial number of all serialized equipment that is removed or installed during the overhaul process must be recorded in the Truck History Books as required by Section 10.10.

The Contractor's quality control system shall adhere to the approved Project Quality Assurance Plan defined in Section 9.1.

Contractor's Quality Control System

- The Contractor's quality control system shall ensure that all necessary operations are performed, properly documented, and verified by qualified quality control personnel at the time the work is completed.

Where applicable, the Contractor shall submit, for City review and approval, a complete package of updated drawings, schematics, illustrated parts catalogs, and maintenance manuals for the trucks, bolsters, and all subcomponents as defined below and in Section 10.1.

- The Contractor shall reference the applicable OEM part numbers on updated information to maintain traceability.
- The Contractor shall update part numbers, quantities, and manufacturer information on all updated bills of material, illustrated parts catalogs, and maintenance manuals.
- The Contractor shall update drawing bills of material, illustrated parts catalogs, and maintenance manuals for all components/assemblies that are altered from the OEM configuration, technical information, including part description, dimensions, material, treatment, and weight.
- The Contractor shall provide as-built drawings or schematics for components/assemblies that are altered from the OEM configuration.

The Contractor shall return to the City all trucks and bolsters fully assembled and ready to run, except for components mounted to the car body. These may be returned separately.

- Except for components mounted to the car body, the City intends to provide trucks and bolsters assembled with all equipment identified in this Specification.

However, there may be instances where trucks cannot be provided to the Contractor fully assembled. The City will notify the Contractor in advance of such circumstances to allow for coordination of shipping and material logistics.

Work performed on, and material applied to, the overhauled trucks and bolsters must be in compliance with the following documents, listed. All materials used for this Contract shall meet the flammability, smoke emission, and toxicity requirements provided in these documents.

- Federal, State (North Carolina), and Local codes and regulations.
- The requirements of Section 8.20 of this Technical Specification.
- Illustrated parts catalogs and maintenance/overhaul manuals as indicated in Section 12.
- Applicable industry standards and recommended practices proposed by the Contractor and approved by the City.

4.3 Non-Documented Damage (Hidden Damage)

Any repairs or replacements that are defined to be 'as necessary' in Section 5 of this Specification shall be considered outside of the base scope of work of this Specification and shall be considered Hidden Damage.

Components/assemblies that are repaired or replaced as necessary throughout the overhaul shall be documented in an NCR and the costs associated with the repair or replacement shall be drawn down from the allotment for hidden damage.

The quantity of components/assemblies that are repaired or replaced as necessary, and the costs associated with the repairs and replacements, shall be updated each month in the monthly progress report referenced in Section 10.8.

The Contractor shall submit an NCR and CAP (including costs) for each necessary Hidden Damage repair in accordance with Section 9.10.6.

- The Contractor shall only proceed with corrective action upon receipt of written approval from the City.
- Work scope may be authorized in phases as disassembly proceeds and determinations of truck condition are made.

The Contractor shall provide a quote and justification for increasing the estimated Hidden Damage allotment should the Contractor anticipate insufficient funds to cover the repairs and replacements for Trucksets that have not been overhauled. The quote and justification shall be submitted to the City for review and approval before proceeding with any Hidden Damage repairs or replacements beyond those covered by the Base Contract Price.

5 SPECIFIC REQUIREMENTS

5.1 1200 – Trucks

5.1.1 12-1 Truck Assembly, Powered

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-1.
2. Powered truck assemblies shall be completely disassembled following Section 3.2 of CATS Heavy Repair Maintenance Manual (HRM), Section 1200.
3. The overhaul of the powered truck assembly shall comply with the following:
   a. Identification plates shall be restored to a like new condition.
   b. Paint shall be removed from the powered truck frames in accordance with Section 8.12 and Section 8.13.
   c. Truck frames shall be measured and compared to OEM drawings per Section 8.17.
   d. The entire truck frame, including all external welds and secondary bracket welds, shall be inspected using visual (VT) and surface non-destruction (NDT) methods per Section 8.1. Magnetic Particle Inspection (MT) shall be used for all steel base material and welds. Dye Penetrant Inspection (PT) shall be used for all non-ferromagnetic base material and welds. Weld repairs shall be completed as necessary.
   e. Truck frames shall be repainted in accordance with Section 8.11.
   f. Guiding rod assemblies shall be cleaned, inspected, painted, and repaired as necessary. All bushings shall be replaced with new components meeting the OEM requirements.
   g. Track brake holders shall be cleaned, inspected, painted, and repaired as necessary.
   h. Front and rear head beam assemblies shall be cleaned, inspected, painted, and repaired as necessary. All bushings shall be replaced with new components meeting the OEM requirements.

5.1.2 12-2 Wiring Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-2.
2. The overhaul of the wiring installation shall comply with the following:
   a. All wiring and cables shall be inspected and replaced as necessary.
   b. Isolation plates shall be replaced with new components that meet the OEM requirements.
   c. Half shells shall be replaced with new components that meet the OEM requirements.
   d. Clamps shall be replaced with new components that meet the OEM requirements.
   e. Clamp plates shall be cleaned, inspected, and replaced as necessary.
   f. Clamp enclosures shall be replaced with new components that meet the OEM requirements.
   g. Brackets shall be cleaned, inspected, and replaced as necessary.
   h. Speed sensors shall be replaced with new components that meet the OEM requirements.
   i. Motor connectors (X11, X12) shall be cleaned, inspected, and replaced as necessary.
   j. Cable markers shall be replaced with new components that meet the OEM requirements.

k. All associated hardware shall be replaced with new components that meet the OEM requirements.

3. Wiring installations shall undergo electrical testing in accordance with Section 8.19.

5.1.3 12-3 Piping Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-3.
2. The overhaul of the piping installation shall comply with the following:
   a. All hose assemblies shall be replaced.
   b. All piping, fittings, and couplings shall be cleaned, inspected, and replaced as necessary.
   c. All piping shall be flushed, dried, and end capped prior to installation.
   d. All associated hardware shall be replaced with new components meeting the OEM requirements.
3. Hydraulic system shall undergo leak testing in accordance with Section 8.15.

5.1.4 12-4 HP Spring Control System Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-4.
2. The overhaul of the HP spring control system shall comply with the following:
   a. HP spring control system shall be replaced with new components meeting the OEM requirements.
   b. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.5 12-5 Track Clearer Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-5.
2. The overhaul of the track clearer installation shall comply with the following:
   a. Rail clearers and plates shall be cleaned, inspected, painted, and repaired as necessary.
   b. Front track clearers shall be replaced with new components meeting the OEM requirements.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.6 12-6 Lifting Stop Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-6.
2. The overhaul of the lifting stops shall comply with the following:
   a. Lifting stops shall be overhauled, including replacement of all hoses.
   b. Nut assembly shall be inspected and replaced as necessary.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.7 12-7 Secondary Suspension, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-7.
2. The overhaul of the secondary suspension shall comply with the following:
   a. Emergency springs shall be replaced with new components meeting the OEM requirements.

b. All emergency springs removed from the trucks shall be returned to the City.
c. Layer springs shall be replaced with new components meeting the OEM requirements.
d. Adapters and shims shall be replaced with new components meeting the OEM requirements.
e. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.8 12-8 Lateral Suspension, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-8.
2. The overhaul of the lateral suspension shall comply with the following:
   a. Lateral buffers shall be replaced with new components meeting the OEM requirements.
   b. All horizontal dampers shall be replaced with new components meeting the OEM requirements.
   c. Lateral stops shall be replaced with new components meeting the OEM requirements.
   d. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.9 12-9 Wheel Guard Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-9.
2. The overhaul of the wheel guard shall comply with the following:
   a. Wheel guards shall be cleaned, inspected, painted, and repaired as necessary.
   b. Rubber mud flaps shall be replaced with new components meeting the OEM requirements.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.10 12-10 Bolster Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-10.
2. The overhaul of the bolster shall comply with the following:
   a. Rings shall be replaced with new components meeting the OEM requirements.
   b. Seals shall be replaced with new components meeting the OEM requirements.
   c. Sliding plates shall be replaced with new components meeting the OEM requirements.
   d. Paint shall be removed from all bolsters in accordance with Section 8.12 and Section 8.13.
   e. Bolsters shall be measured and compared to OEM drawings per Section 8.17.
   f. The entire bolster shall be inspected using visual (VT) and surface non-destruction (NDT) methods per Section 8.1. Magnetic Particle Inspection (MT) shall be used for all steel base material and welds. Dye Penetrant Inspection (PT) shall be used for all non- ferromagnetic base material and welds. Weld repairs shall be completed as necessary.

g. Bolsters shall be repainted in accordance with Section 8.11.
h. Center pins shall be cleaned, inspected, dimensionally checked, and repaired as necessary. Center pins shall be replaced if repair is not possible.
i. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.11 12-11 Primary Suspension Installation, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-11.
2. The primary suspension shall be completely disassembled following Section 3.2.11.1 of the HRM, Section 1200.
3. The overhaul of the primary suspension shall comply with the following:
   a. Chevron springs shall be replaced with new components meeting the OEM requirements.
      Ensure that the same color code chevron is used at all locations on a truck.
   b. Stops shall be cleaned, inspected, painted, and repaired as necessary.
   c. Axle protection bars shall be cleaned, inspected, painted, and repaired as necessary.
   d. Counterstay assemblies shall be cleaned, inspected, painted, and repaired as necessary.
   e. Additional axle suspensions shall be replaced with new components meeting the OEM requirements.
   f. Limit stop plates shall be cleaned, inspected, painted, and repaired as necessary.
   g. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.12 12-12 Traction Motor Mountings, Powered Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-12.
2. The overhaul of the traction motor mountings shall comply with the following:
   a. Support bearings shall be replaced with new components meeting the OEM requirements.
   b. Plates shall be clean, inspected, painted, and repaired as necessary.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.13 12-13 Complete Motor Wheelset, Powered Truck

The components of this assembly are covered by other sections of this Specification.

5.1.14 12-14 Truck Assembly, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-14.
2. Center truck assemblies shall be completely disassembled following Section 3.3 of CATS Heavy Repair Maintenance Manual (HRM), Section 1200.
3. The overhaul of the center truck assembly shall comply with the following:
   a. Identification plates shall be restored as necessary in accordance with Section 8.16.
   b. Paint shall be removed from center truck frames in accordance with

Section 8.12 and Section 8.13.

c. Truck frames shall be measured and compared to OEM drawings per Section 8.17.
d. The entire truck frame, including all external welds and secondary bracket welds, shall be inspected using visual (VT) and surface non-destruction (NDT) methods per Section 8.1. Magnetic Particle Inspection (MT) shall be used for all steel base material and welds. Dye Penetrant Inspection (PT) shall be used for all non-ferromagnetic base material and welds. Weld repairs shall be completed as necessary.
e. Truck frames shall be repainted in accordance with Section 8.11.
f. Hose assemblies shall be replaced with new components that meet the OEM requirements.

Hydraulic system shall undergo leak testing in accordance with Section 8.15.

g. Track clearer installations shall be cleaned, inspected, painted, and repaired as necessary.
h. Track brake holders shall be cleaned, inspected, painted, and repaired as necessary.
i. Speed sensors shall be replaced with new components that meet the OEM requirements.
j. Slip rings (non-grounding contacts) shall be replaced with new components that meet the OEM requirements.
k. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.1.15 12-15 Wiring Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-15.
2. The overhaul of the wiring installation shall comply with the following:
   a. All wiring and cables shall be inspected and replaced as necessary.
   b. Isolation plates shall be replaced with new components that meet the OEM requirements.
   c. Connector shells shall be cleaned, inspected, and replaced as necessary.
   d. Clamps shall be replaced with new components that meet the OEM requirements.
   e. Connection sheets shall be cleaned, inspected, and replaced as necessary.
   f. Brackets shall be cleaned, inspected, and replaced as necessary.
   g. Angles shall be cleaned, inspected, and replaced as necessary.
   h. Contact crimps shall be cleaned, inspected, and replaced as necessary.
   i. Male inserts shall be cleaned, inspected, and replaced as necessary.
   j. Straight couplings shall be cleaned, inspected, and replaced as necessary.
   k. Car body connections shall be replaced with new components that meet the OEM requirements.
   l. Ground cables shall be replaced with new components that meet the OEM requirements.
   m. Ground cable 1 shall be cleaned, inspected, and replaced as necessary.
   n. Flexible conduit shall be replaced with new components that meet the OEM requirements.
   o. Earthing cables shall be cleaned, inspected, and replaced as necessary.
   p. All associated hardware shall be replaced with new components that

meet the OEM requirements.

3. Wiring installations shall undergo electrical testing in accordance with Section 8.19.

5.1.16 12-16 HP Spring Control System Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-16.
2. The overhaul of the HP spring control system shall comply with the following:
   a. HP spring control system installations shall be replaced with new components meeting the OEM requirements.
   b. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.17 12-17 Lifting Stop Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-17.
2. The overhaul of the lifting stops shall comply with the following:
   a. Lifting stops shall be overhauled, including replacement of all bushings and hoses.
   b. Nut assembly shall be inspected and replaced as necessary.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.18 12-18 Secondary Suspension, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-18.
2. The overhaul of the secondary suspension shall comply with the following:
   a. Emergency springs shall be replaced with new components meeting the OEM requirements. All emergency springs removed from the trucks shall be returned to the City.
   b. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.19 12-19 Lateral Suspension, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-19.
2. The overhaul of the lateral suspension shall comply with the following:
   a. Lateral buffers shall be replaced with new components meeting the OEM requirements.
   b. Horizontal dampers shall be replaced with new components meeting the OEM requirements.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.20 12-20 Traction Link Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-20.
2. The overhaul of the traction link installation shall comply with the following:
   a. Guiding rod assemblies shall be cleaned, inspected, painted, and repaired as necessary.
   b. Bushings shall be replaced with new components meeting the OEM requirements.
   c. Guiding rod brackets shall be cleaned, inspected, painted, and repaired as

necessary.
d. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.21 12-21 Wheel Guard Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-21.
2. The overhaul of the wheel guards shall comply with the following:
   a. Wheel guards shall be cleaned, inspected, painted, and repaired as necessary.
   b. Rubber mud flaps shall be replaced with new components meeting the OEM requirements.
   c. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.22 12-22 Primary Suspension Installation, Center Truck

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-22.
2. The primary suspension shall be completely disassembled following Section 3.3.3.1 of the HRM, Section 1200.
3. The overhaul of the primary suspension installation shall comply with the following:
   a. Conical springs shall be replaced with new components meeting the OEM requirements. Ensure that the same spring code conical is used at all locations on a truck.
   b. Guiding rods shall be cleaned, inspected, painted, and repaired as necessary.
   c. Guiding rod bushings shall be replaced with new components that meet the OEM requirements.
   d. Lifting plates shall be cleaned, inspected, painted, and repaired as necessary.
   e. Lifting stops shall be cleaned, inspected, painted, and repaired as necessary.
   f. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.1.23 12-23 MB Preassembly

1. The components relevant to the requirements of this section are presented in IPC Section 1200, Figure 12-23.
2. The overhaul of the MB preassembly shall comply with the following:
   a. Terminal box assemblies shall be cleaned, inspected, and all sealing gaskets shall be replaced.
   b. Enclosures shall be cleaned, inspected, and replaced as necessary.
   c. Mounting plates shall be cleaned, inspected, and replaced as necessary.
   d. Mounting rail signs shall be cleaned, inspected, and replaced as necessary.
   e. Cable glands shall be replaced with new components that meet the OEM requirements.
   f. Edge protectors shall be inspected and replaced as necessary. Wiring at this location shall be inspected and replaced as needed.
   g. Fittings shall be replaced with new components that meet the OEM requirements.
   h. Sealing inserts shall be replaced with new components that

meet the OEM requirements.

i. Clamping saddles shall be cleaned, inspected, and replaced as necessary.
j. Venting elements shall be cleaned, inspected and replaced as necessary.
k. Assembly connectors shall be replaced with new components that meet the OEM requirements.
l. Grounding cables shall be cleaned, inspected, and replaced as necessary.
m. Motor cables shall be cleaned, inspected, and replaced as necessary.
n. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.2 1201 – Powered Truck Wheel-Axle Assembly

1. The components relevant to the requirements of this section are presented in IPC Section 1201, Figure 12.1-1 and Figure 12.1-2.
2. The overhaul of the driving wheelset shall comply with the following:
   a. The entire exterior surface of the axles shall be thoroughly cleaned.
   b. Ensure proper corrosion protection per Section 8 of the HRM, Section 1201.
   c. Axles shall be dimensionally inspected per Section 8.17.
   d. Axles shall be VT, MT, and UT inspected in conformance with Section 8.1.
   e. Inspect mounting seats for condemning marks and grooves per AAR Section G-II – Wheel and Axle Shop Manual or Approved equal.
   f. Nonconforming axles shall be replaced with new components meeting OEM requirements. Axle repair is unacceptable and is not within the Contractor's scope.
3. The overhaul of the driving wheel shall comply with the following:
   a. Tires shall be replaced with new components meeting the OEM requirements.
   b. Wheel centers shall be cleaned, inspected, and replaced as necessary.
   c. Ensure proper corrosion protection per Section 8 of the HRM, Section 1201.
   d. Detachable rings shall be cleaned, inspected, and replaced as necessary.
   e. Rubber blocks shall be replaced with new components meeting the OEM requirements.
   f. Copper shunts shall be replaced with new components meeting the OEM requirements.
   g. Seals shall be replaced with new components meeting the OEM requirements.
   h. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.3 1202 – Low floor Axle & Wheelset

1. The components relevant to the requirements of this section are presented in IPC Section 1202, Figure 12.2-1, Figure 12.2-2 and Figure 12.2-3.
2. The overhaul of the low floor axle assembly shall comply with the following:
   a. The entire exterior surface of the axles shall be thoroughly cleaned.
   b. Ensure proper corrosion protection per Section 5.4 of the HRM, Section 1202.
   c. Axles shall be dimensionally inspected per Section 8.17.
   d. Axles shall be VT, MT, and UT inspected in conformance with Section 8.1.
   e. Nonconforming axles shall be replaced with new components meeting OEM requirements. Axle repair is unacceptable and is not within the Contractor's scope.
   f. Covers shall be cleaned, inspected, painted, and replaced as necessary.
   g. Sealing elements shall be replaced with new components meeting the OEM requirements.
   h. Backing rings shall be cleaned, inspected, and replaced as necessary.
   i. Impulse wheels shall be cleaned, inspected, and replaced as necessary.
   j. Hub flanges shall be cleaned, inspected, painted, and repaired as necessary.

k. Hub flange spacer rings shall be cleaned, inspected, painted, and repaired as necessary.
l. Hub flange o-rings shall be replaced with new components meeting the OEM requirements.
m. Tapered bearing assemblies shall be replaced with new components that meet the OEM requirements.
n. Connecting rod supports shall be cleaned, inspected, painted, and repaired as necessary.
o. End Caps shall be cleaned, inspected, painted, and repaired as necessary.
p. All associated hardware and seals shall be replaced with new components meeting the OEM requirements.

3. The overhaul of the low floor wheels (with shunts) shall comply with the following:
   a. Tires shall be replaced with new components meeting the OEM requirements.
   b. Wheel centers shall be cleaned, inspected, and replaced as necessary.
   c. Ensure proper corrosion protection per Section 5.4 of the HRM, Section 1202.
   d. Detachable rings shall be cleaned, inspected, and replaced as necessary.
   e. Rubber blocks shall be replaced with new components meeting the OEM requirements.
   f. Copper shunts shall be replaced with new components meeting the OEM requirements.
   g. Seals shall be replaced with new components meeting the OEM requirements.
   h. All associated hardware shall be replaced with new components meeting the OEM requirements.
4. The overhaul of the low floor wheels (without shunts) shall comply with the following:
   a. Tires shall be replaced with new components meeting the OEM requirements.
   b. Wheel centers shall be cleaned, inspected, and replaced as necessary.
   c. Ensure proper corrosion protection per Section 5.4 of the HRM, Section 1202.
   d. Detachable rings shall be cleaned, inspected, and replaced as necessary.
   e. Rubber blocks shall be replaced with new components meeting the OEM requirements.
   f. Seals shall be replaced with new components meeting the OEM requirements.
   g. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.4 1203 – Traction Motor

1. The components relevant to the requirements of this section are presented in IPC Section 1203, Figure 12.3-1.
2. The overhaul of the traction motors shall comply with the following:
   a. Traction motors shall be disassembled, cleaned, inspected, repaired, reassembled, and tested in accordance with Section 5.4 and Section 5.5 of the HRM, Section 1203. Traction motor overhaul shall be performed in a clean environment, carefully controlled to prevent dirt or debris from entering the traction motor, or any motor components.
   b. Stators shall be cleaned, inspected, repainted, and tested per Section 5.5.2 of the HRM, Section 1203.
   c. Ductile iron bearings shall be replaced with new components meeting the OEM requirements.
   d. Rotor shaft, core assembly, and cage winding shall be inspected for mechanical damage and replaced as necessary per Section 5.5.3 of the HRM, Section 1203.
   e. Balancing weights shall be replaced as necessary during the re-build. The rotor shall be dynamically balanced per Section 5.6.1 of the HRM, Section 1203.
   f. Bearing cartridges shall be cleaned, inspected, and replaced as necessary

per Section 5.5.5, Section 1203.

g. Cylindrical roller bearings shall be replaced with new components that meet the OEM requirements.
h. O-rings shall be replaced with new components that meet the OEM requirements.
i. Bearing shields shall be cleaned, inspected, repainted, and repaired as necessary.
j. Terminal box covers shall be cleaned, inspected, repainted, ad repaired as necessary.
k. Insulators shall be tested and replaced as necessary per Section 5.5.4 of the HRM, Section 1203.
l. Connecting leads shall be tested and replaced as necessary per Section 5.3.2 of the HRM, Section 1203.
m. Tachometers shall be replaced with new components meeting the OEM requirements.
n. Plates shall be cleaned, inspected, and updated as necessary.
o. Ground labels shall be renewed as necessary.
p. Additional plates shall be updated with overhaul information.
q. Coupling halves shall be cleaned, inspected, and replaced as necessary per Section 10 of RMS, Section 1204.
r. Hinged gear assembly covers shall be cleaned, inspected, repainted, and repaired as necessary.
s. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.5 1204 – Axle Gear Unit

1. The components relevant to the requirements of this section are presented in IPC Section 1204, Figure 12.4-1.
2. The overhaul of the axle gear units shall comply with the following:
   a. Axle gear unit assemblies shall be overhauled, including the replacement of all bearings and seals, in accordance with the RMS and HRM, Section 1204.
   b. Housings shall be cleaned, inspected, painted, and repaired as necessary.
   c. Magnetic dipsticks shall be replaced with new components meeting the OEM requirements.
   d. Covers shall be cleaned, inspected, painted, and repaired as necessary.
   e. Filter breathers shall be replaced with new components meeting the OEM requirements.
   f. Oil level glasses shall be replaced with new components meeting the OEM requirements.
   g. Pinion shafts shall be cleaned, inspected, and replaced as necessary.
   h. Retaining pins shall be cleaned, inspected, and replaced as necessary.
   i. Spring type pins shall be cleaned, inspected, and replaced as necessary.
   j. Intermediate shafts shall be cleaned, inspected, and replaced as necessary.
   k. Spur gears shall be cleaned, inspected, and replaced as necessary.
   l. Spacer rings shall be cleaned, inspected, and replaced as necessary.
   m. Labyrinth rings shall be cleaned, inspected, and replaced as necessary.
   n. Labyrinth covers shall be cleaned, inspected, and replaced as necessary.
   o. Adjusting rings shall be replaced with new components that meet the OEM requirements.
   p. Coupling halves shall be removed, cleaned, inspected, and replaced as necessary, in accordance with Section 10 of RMS and Section 3.4.3 of HRM, Section 1204.
   q. Pinions shall be cleaned, inspected, and replaced as necessary.

r. Hollow shafts shall be cleaned, inspected, and replaced as necessary.
s. Rings shall be cleaned, inspected, and replaced as necessary.
t. Suspension supports shall be replaced with new components that meet the OEM requirements.
u. Suspension spacer sleeves shall be cleaned, inspected, and replaced as necessary.
v. Circlips shall be replaced with new components that meet the OEM requirements.
w. Name and rating plates shall be cleaned, inspected, renewed, and updated.
x. Instruction plates shall be cleaned, inspected, and renewed if necessary.
y. Rubber pads shall be replaced with new components that meet the OEM requirements.
z. Cardan drums shall be cleaned, inspected, painted, and repaired as necessary.
aa. Axle spiders shall be cleaned, inspected, painted, and repaired as necessary.
bb. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.6 1205 – Grounding Contact

1. The components relevant to the requirements of this section are presented in IPC Section 1205, Figure 12.5-1 and Figure 12.5-2.
2. The overhaul of the powered truck grounding device assembly shall comply with the following:
   a. Sealing elements shall be replaced with new components that meet the OEM requirements.
   b. Housing rings shall be cleaned, inspected, and replaced as necessary.
   c. Felt strips shall be replaced with new components that meet the OEM requirements.
   d. Contact discs shall be replaced with new components that meet the OEM requirements.
   e. Contact disc carriers shall be cleaned, inspected, and replaced as necessary.
   f. Adapters shall be cleaned, inspected, and replaced as necessary.
   g. Housings shall be cleaned, inspected, and replaced as necessary.
   h. Carbon brushes shall be replaced with new components meeting the OEM requirements.
   i. All associated hardware shall be replaced with new components that meet the OEM requirements.
3. The overhaul of the center truck grounding assemblies shall comply with the following:
   a. Contacts shall be replaced with new components that meet the OEM requirements.
   b. Contact bridges shall be replaced with new components that meet the OEM requirements.
   c. Brushes shall be replaced with new components that meet the OEM requirements.
   d. Housings shall be cleaned, inspected, and replaced as necessary.
   e. Contact discs shall be replaced with new components that meet the OEM requirements.
   f. Sealing elements shall be replaced with new components that meet the OEM requirements.
   g. Insulating shims shall be cleaned, inspected, and replaced as necessary.
   h. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.7 1206 – Powered Truck Journal Bearings

1. The components relevant to the requirements of this section are presented in IPC Section 1206, Figure 12.6-1.
2. The overhaul of the powered truck journal bearing assembly shall comply with:
   a. Bearings, bearing seals, and all associated bearing enclosures, spacers, and grommets shall be replaced with new components that meet the OEM requirements.
   b. Housings shall be cleaned, inspected, painted, and replaced as necessary.
   c. Backing rings shall be cleaned, inspected, and replaced as necessary.
   d. Covers shall be cleaned, inspected, painted, and repaired as necessary.
   e. Axle end caps shall be cleaned, inspected, painted, and repaired as necessary.
   f. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.8 1207 – Sanding System

The sanding system is not within the Contractor's scope.
Sanding nozzles will be removed by CATS prior to shipment.

5.9 1300 – Friction Brakes

5.9.1 13-1 Friction Brake System

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-1.
2. The overhaul of the friction brake system shall comply with the following:
   a. Brake pads shall be replaced with new components meeting the OEM requirements.
   b. 72 PSI pressure switches shall be replaced with new components meeting the OEM requirements.

5.9.2 ESRA

The ESRA system components are not within the Contractor's scope.

5.9.3 13-3 Current Regulator

The current regulator is not within the Contractor's scope.

5.9.4 Electro-Hydraulic Unit (EHU)

1. The EHU's are body mounted equipment shipped with associated hoses separate from the truck assembly.
2. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-4, Figure 13-5, Figure 13-6, Figure 13-7, Figure 13-8, and Figure 13-9.
3. The overhaul of the EHUs shall comply with the following:
   a. All powered truck EHUs shall be overhauled in accordance with Section 3.6 of the HRM, Section 1300.
      i. Valves and transducers shall be replaced with new components that meet the OEM requirements.
      ii. Hand valves shall be overhauled in accordance with Section 3.17 of the HRM, Section 1300.
      iii. Sight glasses shall be replaced with new components that meet the OEM requirements.
      iv. Tested in accordance with Appendix K of the HRM, Section 1300.
   b. All center truck EHUs shall be overhauled in accordance with Section 3.27 of the HRM, Section 1300.

i. Valves and transducers shall be replaced with new components that meet the OEM requirements.
ii. Hand valves shall be overhauled in accordance with Section 3.17 of the HRM, Section 1300.
iii. Sight glasses shall be replaced with new components that meet the OEM requirements.

c. Tested in accordance with Appendix L of the HRM, Section 1300.All associated hardware shall be replaced with new components that meet the OEM requirements.

5.9.5 13-10 Pressure Regulating Valve

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-10.
2. The overhaul of the pressure regulating valves shall comply with the following:
   a. Pressure regulating valves shall be replaced with new components that meet the OEM requirements.
   b. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.9.6 Accumulators

1. The accumulators are body mounted equipment and will be scrapped at CATS prior to truck shipment.
2. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-11, Figure 13-12, and Figure 13-31.
3. The overhaul of the accumulators shall comply with the following:
   a. Accumulators shall be replaced with new components meeting the OEM requirements.
   b. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.9.7 Brake Calipers

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-15, Figure 13-16, Figure 13-17, Figure 13-18, Figure 13-19, and Figure 13-30.
2. The overhaul of the brake calipers shall comply with the following:
   a. Powered truck brake calipers shall be overhauled in accordance with Section 3.50 of the HRM, Section 1300.
   b. Center truck brake calipers shall be overhauled in accordance with Section 3.49 of the HRM, Section 1300.
   c. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.9.8 Brake Discs

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-20, Figure 13-21, and Figure 13-22.
2. The overhaul of the brake discs shall comply with the following:
   a. Brake discs shall be replaced with new components that meet the OEM requirements.
   b. All associated hardware shall be replaced with new components that meet the OEM requirements.

5.9.9 13-23 Hand Pump Unit

1. The Hand Pumps are body mounted tools and will be shipped separately from the truck assembly.
2. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-23.
3. The overhaul of the hand pump unit shall comply with the following:
   a. [Option 1] Hand pump units shall be overhauled according to the OEM.
   b. [Option 2] Hand pump units shall be replaced with new components that meet the OEM requirements.

5.9.10 Selector Valve

1. The center truck Selector Valve is body mounted equipment and will be shipped separate from the truck assembly.
2. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-24 and Figure 13-25.
3. The overhaul of the selector valves shall comply with the following:
   a. Powered truck selector valves shall be inspected and replaced as necessary.
   b. Center truck selector valves shall be overhauled in accordance with Section 3.48 of the HRM, Section 1300. Valves shall be tested in accordance with Appendix B of the HRM, Section 1300.

5.9.11 13-26 0.2L Oil Reservoir

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-26.
2. The overhaul of the oil reservoir shall comply with the following:
   Oil reservoirs shall be replaced with new components that meet the OEM requirements.

5.9.12 Hydraulic Suspension Legs

1. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-27 and Figure 13-28.
2. The overhaul of the hydraulic suspension legs shall comply with the following:
   a. Suspension legs shall be overhauled in accordance with Section 3.51 of the HRM, Section 1300.
   b. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.9.13 13-29 Level Sensor

1. The center truck Level Sensor is body mounted equipment and will be shipped separate from the truck assembly.
2. The components relevant to the requirements of this section are presented in IPC Section 1300, Figure 13-29.
3. The overhaul of the level sensor shall comply with the following:
   Level sensors shall be replaced with new components that meet the OEM requirements.

5.10 1301 – Track Brakes

1. The components relevant to the requirements of this section are presented in IPC Section 1301, Figure 13.1-2 and Figure 13.1-3.
2. The overhaul of the track brakes shall comply with the following:
   a. Track brakes shall be overhauled in accordance with Section 3.3 of the HRM,

Section 1301.
All magnet coils shall be megger tested per Section 3.3.3 of the HRM, Section 1301. Replace as necessary.

b. Track brake spring suspensions shall be overhauled in accordance with 3.4 of the HRM, Section 1301.
All compression springs shall be tested and replaced as necessary.
c. Wearing plates shall be replaced with new components meeting the OEM requirements.
d. Tie bars shall be cleaned, inspected, and repaired as necessary.
e. Flanged bushings shall be replaced with new components that meet the OEM requirements.
f. Cable terminals shall be cleaned, inspected, and replaced as necessary.
g. Rail shoes shall be replaced with new components that meet the OEM requirements.
h. Strips shall be replaced with new components that meet the OEM requirements.
i. Stoppers shall be replaced with new components that meet the OEM requirements.
j. Ring pins shall be replaced with new components that meet the OEM requirements.
k. Name plates shall be restored to a like new condition.
l. All associated hardware shall be replaced with new components meeting the OEM requirements.

5.11 1900 – ATP/TWC

The ATP is not within the Contractor's scope. ATP receiver coils will be removed by CATS prior to shipment.

6 FINAL ASSEMBLY

6.1 General

1. This section provides requirements for final assembly, inspection, and functional test of powered trucks, powered truck bolsters, and center trucks that have been overhauled in accordance with the requirements of this Specification.
2. The Contractor is responsible for ensuring that overhauled trucks, bolsters, and all car body mounted equipment are fully functional and ready-to-run prior to return shipment to the City. In addition to the minimum requirements of this Section, the Contractor shall perform all inspections and functional tests necessary to ensure complete functionality of all truck systems.
3. Procedures for final assembly inspection and functional testing of overhauled trucks, bolsters, and all car body mounted equipment shall be submitted for City review and approval prior to beginning these processes. **[CDRL 6-1]**
4. All inspection and functional test results and corrective actions performed shall be recorded in the Truck History Books provided by the Contractor per Section 10.10.

6.2 Final Assembly

1. Reassembly of the powered trucks and bolsters shall be performed in accordance with Section 3.2 of the HRM, Section 1200.
2. Reassembly of the center trucks shall be performed in accordance with Section 3.3 of the HRM, Section 1200.

6.3 Inspection

1. Inspection of the assembled powered trucks and bolsters shall be performed in accordance with the Approved final assembly inspection and test procedure. At a minimum, the following steps shall be performed:
   a. Measure and record the tram of the truck at simulated AW0 loading.
   b. Measure and record the track clearer bar height at simulated AW0 loading.
   c. Measure and record axle parallelism at simulated AW0 loading.
   d. Measure and record wheel loads at simulated AW0 loading.
   e. Measure and record back-to-back dimensions for both the wheel hub and the tires on both axles.
   f. Measure and record the wheel diameter on all four wheels.
   g. Measure and record the radial and axial runout of the wheel and the axial runout of the brake disc.
   h. Record the press charts for both wheel hubs and the coupling on both axles.
   i. Measure the ground path impedance from the truck ground connection to the bolster frame, from the tire of each wheel to the truck ground connection, and between tires on the same axle.
   j. Acceptance criteria for all of the above measurements shall meet OEM requirements.
2. Inspection of the assembled center trucks shall be performed in accordance with the Approved final assembly inspection and test procedure. At a minimum, the following steps shall be performed:
   a. Measure and record the tram of the truck at simulated AW0 loading.
   b. Measure and record axle parallelism at simulated AW0 loading.
   c. Measure and record wheel loads at simulated AW0 loading.
   d. Measure and back-to-back dimensions for both the wheel hub and the tires on both axles.
   e. Measure and record the wheel diameter on all four wheels.

f. Measure and record the radial and axial runout of the wheel.
g. Measure the ground path impedance from the tire of each wheel to the truck ground connection, and between tires on the same axle.
h. Acceptance criteria for all of the above measurements shall meet OEM requirements.

3. All non-conforming components identified during inspection shall be repaired or replaced by the Contractor and the relevant inspections repeated prior to truck acceptance.

6.4 Functional Test

1. The following functional tests shall be performed on all powered trucks and bolsters at the completion of final assembly and inspection.
   a. Perform an insulation resistance test on all truck wiring in accordance with Section 8.19.
   b. Perform a functional test of the track brake and disc brake systems.
      i. Check for leakage of any hoses, pipes, valves, or fittings.
      ii. Testing shall be performed using the overhauled EHU associated with that truck, new properly charged accumulators, and associated hoses.
   c. Test the functionality of the leveling sensor following the OEM procedure and verify the leveling sensor output signal.

2. The following functional tests shall be performed on all center trucks at the completion of final assembly and inspection.
   a. Perform a functional test of the track brake and disc brake systems.
      i. Check for leakage of any hoses, pipes, valves, or fittings.
      ii. Testing shall be performed using the overhauled EHU associated with that truck, new properly charged accumulators, and associated hoses.
   b. Test the functionality of the leveling sensor following the OEM procedure and verify the leveling sensor output signal.
   c. Following functional testing of the center trucks, the hydraulic system shall be completely drained and all inlet ports, outlet ports, exhaust ports, and open hose ends shall be plugged and protected from contamination.

3. All non-conforming components identified during functional tests shall be repaired or replaced by the Contractor and all functional tests repeated prior to truck acceptance.

7 BURN-IN TEST

7.1 General

1. This section provides requirements for a burn-in test that shall be performed on powered trucks and bolsters following final assembly, inspection, and functional test.
2. The Contractor is responsible for ensuring that overhauled trucks are fully functional and ready- to-run prior to return shipment to the City. In addition to the minimum requirements of this Section, the Contractor shall perform all burn-in tests necessary to ensure complete functionality of all truck systems.
3. Procedures for burn-in testing shall be submitted for City review and approval prior to beginning any tests. **[CDRL 7-1]**
4. All burn-in test results and corrective actions performed shall be recorded in the Truck History Books provided by the Contractor per Section 10.10.
5. The City shall be notified of all burn-in tests and provided with an opportunity to witness each test.

7.2 Burn-In Test

1. The burn-in test shall consist of powering the traction motors to rotate the axle assemblies for at least 30 minutes in each direction, at an equivalent vehicle speed of 55 mph, under simulated load conditions. During the test, the following items shall be measured:
   a. Traction motor phase connections and direction of operation.
   b. Journal bearing temperature.
   c. Gear unit, traction motor, and journal bearing noise and/or vibration.
      i. Acceleration and/or acoustic methods may be used for this measurement, as approved by the City.
   d. Gear unit oil temperature.
   e. Gear unit bearing temperature.
   f. Traction motor bearing temperature.
   g. Traction motor surface and/or stator coil temperature.
   h. Optical encoder speed sensor output signal.
2. After the burn-in test, the following measurements and inspections shall be repeated:
   a. Inspect the magnetic dipstick for metal filings and clean the magnet prior to reinstalling. Large metal chips or pieces of metal stuck to the magnetic dipstick are cause for failure and shall require a Corrective Action Plan.
   b. Inspect the gearbox for evidence of leaking oil.
   c. Visually inspect the gearbox bearings, traction motor bearings, and journal bearings for evidence of overheating or other damage.
   d. Test the insulation resistance of the high-voltage truck wiring in accordance with Section 8.19.
   e. Test the ground path impedance from the tire of each wheel to the truck ground connection and between tires on the same axle.
3. The Contractor shall develop acceptance criteria for burn-in test measurements and shall submit to the City for review and approval.
4. All non-conforming components identified during or following burn-in test shall be repaired or replaced by the Contractor and the complete burn-in test repeated prior to truck acceptance.
5. Gearbox oil shall be drained following burn-in testing. The drained gearbox shall be clearly tagged to indicate that it requires filling prior to operation.
6. The powered truck hydraulic system shall be completely drained and all inlet ports, outlet ports, exhaust ports, and open hose ends shall be plugged and protected from contamination.

8 COMMON WORK REQUIREMENTS

8.1 Non-Destructive Inspection (NDT)

8.1.1 Visual Inspection (VT)

1. The Contractor shall submit a visual inspection procedure with acceptance criteria for City approval prior to beginning the truck overhaul. **[CDRL 8-1]**
2. The Contractor shall establish minimum lighting criteria to use during visual inspection.
3. Borescope inspection may be used in lieu of direct visual inspection for inaccessible or difficult- to-access locations.
4. VT inspection acceptance/rejection criteria for wear, damage, deformation, corrosion, burning, plating integrity, or other defects shall be proposed by the Contractor for City approval.
5. Electrical components shall be inspected for damaged or worn insulation, loose, or damaged contacts, scorching, illegible or missing wire markers, or other defects impacting serviceability.
6. VT inspection acceptance/rejection criteria for cracks and weld defects shall be as follows:
   a. Cast base materials: ASTM E125 Type 1 discontinuities with severity level greater than 1 shall be rejected.
   b. Fabricated Components - Base Material: Indications with a major axis longer than 1/8" shall be rejected.
   c. Fabricated Components - Welds: Acceptance criteria per AWS D1.1, latest revision, or other City approved industry standard.
   d. Axles: Acceptance criteria per AAR M-101, latest revision.

8.1.2 Magnetic Particle Inspection (MT)

1. MT inspections shall be performed in accordance with the latest revision of ASTM E709.
2. Half wave-rectified alternating current shall be used, sufficient to detect surface and sub- surface defects.
3. Adequate magnetic field strength shall be verified using a "pie gage" (Field Strength Indicator).
4. The affected area of the truck shall be demagnetized to not more than 5 gausses upon completion of all magnetic particle testing.
5. MT inspection acceptance/rejection criteria shall be as follows:
   a. Cast base materials: ASTM E125 Type 1 discontinuities with severity level greater than 1 shall be rejected.
   b. Fabricated Components - Base Material: Indications with a major axis longer than 1/8" shall be rejected.
   c. Fabricated Components - Welds: Acceptance criteria per AWS D1.1, latest revision or other City approved industry standard.
   d. Axles: Acceptance criteria per AAR M-101, latest revision.
6. The inspector performing the inspection shall be certified, qualified to operate the equipment, perform the MT inspection, and evaluate the results in accordance with ASNT SNT-TC-1A, Level II of higher, or City Approved Alternate. Written inspector certification records shall be made available for review at the City's request.
7. The Contractor shall submit a written MT inspection procedure with acceptance criteria for City approval prior to beginning the truck overhaul. **[CDRL 8-2]**

8.1.3 Dye Penetrant Inspection (PT)

1. PT inspections shall be performed in accordance with the latest revision of ASTM E165.
2. PT inspection acceptance/rejection criteria shall be as follows:
   a. Fabricated Components - Welds: Acceptance criteria per AWS D1.1, latest revision, or other City approved industry standard.
   b. Fabricated Components - Base Material: Indications with a major axis longer than 1/8" shall be rejected.
3. The inspector performing the inspection shall be certified to perform the PT inspection and evaluate the results in accordance with ASNT SNT-TC-1A, Level II of higher, or City Approved alternate. Written inspector certification records shall be made available for review at the City's request.
4. The Contractor shall submit a written PT inspection procedure with acceptance criteria for City approval prior to beginning the truck overhaul. **[CDRL 8-3]**

8.1.4 Ultrasonic Inspection (UT)

1. UT inspections shall be performed in accordance with the latest revision of ASTM A388.
2. UT inspection acceptance/rejection criteria shall be as follows:
   a. Axles: Acceptance criteria per AAR M-101, latest revision.
3. The inspector performing the inspection shall be certified to perform the UT inspection, and evaluate the results in accordance with ASNT SNT-TC-1A, Level II of higher, or City Approved alternate. Written inspector certification records shall be made available for review at the City's request.
4. The Contractor shall submit a written UT inspection procedure with acceptance criteria for City approval prior to beginning the truck overhaul. **[CDRL 8-4]**

8.2 Weld Repairs of Cracks in Fabricated Structures

1. Except with written City approval, this Section is not applicable for stamped or forged parts; parts fabricated from quench and tempered, thermo-mechanically processed, or precipitation hardened materials; bearing surfaces; press-fit surfaces; or any surface that cannot be brought into full conformance with OEM requirements after welding and grinding.
2. Weld repair of cracks or defects in fabricated structures that are less than 6 inches in length are within the Contractor's base scope of work. Cracks longer than 6 inches shall be considered Hidden Damage and the Contractor shall submit a CAP for City review and approval in accordance with Section 9.10.6.
3. Cracked or defective welds shall be repaired using weld preparation matching the OEM weld layout.
4. Cracks shall be prepared for welding by grinding or gouging. The area surrounding the weld joint preparation shall be free from scale, oil, dirt, and other extraneous matter.
5. If air or carbon arc gouging is used for preparation, a minimum of 1/8 inch of material shall be removed from all gouged surfaces by grinding prior to welding.
6. If the crack occurs in the base material, the joint preparation shall be as follows:
   a. If the crack extends through the base material and the root of the weld is accessible, a "double V" joint preparation shall be used, and the weld shall be performed from both sides. The root of the weld shall be chipped, ground, or scarfed clean and MT inspected prior to welding from the opposite side.
   b. If the crack extends through the base material and the root of the weld is inaccessible, a "single V" joint preparation shall be used, extending completely through the base material, and a backing strip shall be used. The backing strip

shall be removed after welding and weld qualifications shall be performed using the same backing material as for repair welds. Extreme cases where the backing cannot be removed shall be brought to the City's attention prior to preparing the crack.

c. If the crack extends only partially through the base material, a "single V" joint preparation shall be used, and the weld shall be performed from one side only.
d. If the crack occurs in a weld, the weld shall be completely removed for the entire length of the crack. Joint preparation and welding shall be performed matching the OEM weld layout.

7. Reference the applicable equipment Section for OEM weld layouts.
8. Regardless of the joint preparation used, MT inspection shall be performed prior to welding to verify that the crack has been completely removed.
9. The structure being welded shall be held securely during welding to prevent distortion.
10. Welding shall be performed using flux cored arc welding (FCAW), gas metal arc welding (GMAW), shielded metal arc welding (SMAW) or City approved welding process.
11. Welding consumables such as electrode, shielding gas, and backing shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. Welding consumables are subject to City review.
12. Preheat and inter-pass temperature shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
13. Stringer beads shall be used for all welds, limiting side-to-side motion to 5 times the electrode diameter.
14. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard, and the requirements of Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
15. Where possible, welding shall be performed in the flat position. All other positions require additional weld and welder qualifications. Vertical welding is permitted only in the up direction.
16. After completing the root weld pass, MT inspection shall be performed to assure that a sound weld has been made. MT inspection shall be performed after each intermediate weld pass to verify soundness of the weld pass.
17. Defects found during MT shall be removed and repaired using a City approved procedure.
18. The root pass and each intermediate weld pass shall be de-slagged or peened with an air driven hammer until cleaned to bare metal.
19. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
20. The completed weld shall be finished by grinding, where applicable. MT and VT shall be performed to identify defects such as cracks, lack of fusion, porosity, slag inclusions, or undercut.
21. Defects found shall be removed and repaired using a City approved procedure.
22. As a final operation, the entire weld and ½ inch of the parent material on each side shall be peened.
23. Wherever MT inspection is required, VT inspection shall also be performed. For non-ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.

24. The Contractor shall submit a weld repair procedure for cracks in fabricated structures for City approval prior to welding any parts. **[CDRL 8-5]**

8.3 Weld Repairs of Defects in Castings

1. Weld repair of cracks or defects in cast material that are less than 6 inches in length are within the Contractor's base scope of work. Cracks longer than 6 inches shall be considered Hidden Damage and the Contractor shall submit a CAP for City review and approval in accordance with Section 9.10.6.
2. Defects shall be prepared for welding by grinding or gouging. The area surrounding the weld joint preparation shall be free from scale, oil, dirt, and other extraneous matter.
3. If air or carbon arc gouging is used for preparation, a minimum of 1/8 inch of material shall be removed from all gouged surfaces by grinding prior to welding.
4. The joint preparation shall be as follows:
   a. If the defect extends through the base material and the root of the weld is accessible, a "double V" joint preparation shall be used, and the weld shall be performed from both sides. The root of the weld shall be chipped, ground, or scarfed clean and MT inspected prior to welding from the opposite side.
   b. If the crack extends through the base material and the root of the weld is inaccessible, a "single V" joint preparation shall be used, extending completely through the base material, and a backing strip shall be used. The backing strip shall be removed after welding and weld qualifications shall be performed using the same backing material as for repair welds. Extreme cases where the backing cannot be removed shall be brought to the City's attention prior to preparing the defect.
   c. If the defect extends only partially through the base material, a "single V" joint preparation shall be used, and the weld shall be performed from one side only.
5. Regardless of the joint preparation used, MT inspection shall be performed prior to welding to verify that the defect has been completely removed.
6. The casting being welded shall be held securely during welding to prevent distortion.
7. Welding shall be performed using flux cored arc welding (FCAW) or shielded metal arc welding (SMAW) only. Welding consumables such as electrode, shielding gas, and backing shall be appropriate for the material(s) being welded and the resulting weld deposit shall have a tensile strength exceeding the minimum tensile strength of the base material. Welding consumables are subject to City review.
8. Preheat and inter-pass temperature shall be appropriate for the material(s) being welded to prevent cracking or embrittlement of the weld or heat affected zone (HAZ). In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
9. Stringer beads shall be used for all welds, limiting side-to-side motion to 5 times the electrode diameter.
10. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of ASTM A488 and Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
11. Where possible, welding shall be performed in the flat position. All other positions require additional weld and welder qualifications. Vertical welding is permitted only in the up direction.
12. After completing the root weld pass, MT inspection shall be performed to assure that a sound weld has been made. MT inspection shall be performed after each intermediate weld pass to verify soundness of the weld pass.
13. Defects found during MT shall be removed and repaired using a City approved procedure.
14. The root pass and each intermediate weld pass shall be de-slagged or peened with

an air driven hammer until cleaned to bare metal.

15. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
16. The completed weld shall be finished by grinding, where applicable. MT and VT shall be performed to identify defects such as cracks, lack of fusion, porosity, slag inclusions, or undercut.
17. Defects found shall be removed and repaired using a City approved procedure.
18. As a final operation, the entire weld and ½ inch of the parent material on each side shall be peened.
19. Wherever MT inspection is required, VT inspection shall also be performed. For non-ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.
20. The Contractor shall submit a weld repair procedure for defects in castings for City approval prior to welding any parts. **[CDRL 8-6]**

8.4 Weld Repairs of Mounting Surfaces

1. Except with written City approval, this Section is not applicable for stamped or forged parts; parts fabricated from quench and tempered, thermo-mechanically processed, or precipitation hardened materials; bearing surfaces; press-fit surfaces; or any surface that cannot be brought into full conformance with OEM requirements after welding and grinding or machining.
2. Nonconforming mounting surfaces shall be prepared for welding by machining or grinding. Joint preparation shall allow for sufficient opening to achieve complete fusion at the root of the weld. The mounting location shall be free from scale, oil, dirt, and other extraneous matter.
3. The structure being welded shall be held securely during welding to prevent distortion.
4. Welding shall be performed using arc welding or City approved welding process.
5. Welding consumables such as electrode and shielding gas, shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. Welding consumables are subject to City review.
6. Preheat and inter-pass temperature shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
7. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard, and the requirements of Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
8. Welding shall be performed in the flat position.
9. The Contractor shall demonstrate that the hardness of the weld deposit meets OEM requirements for the part being repaired.
10. The mounting surface shall be built up by welding to a sufficient thickness that it can be machined or ground flush to achieve a flat, defect-free surface in accordance with all OEM drawing requirements.
11. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
12. The entire weld and ½ inch of the parent material on each side shall be peened.
13. Following any specified heat treatment, the welded mounting surface shall be finished by machining or grinding. The flatness measurement of the mounting location shall be repeated to verify compliance with the specification requirements.
14. MT and VT shall be performed to identify defects such as cracks, lack of fusion,

porosity, slag inclusions, or undercut.

15. Defects found shall be removed and repaired using a City approved procedure.
16. Wherever MT inspection is required, VT inspection shall also be performed. For non- ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.
17. The Contractor shall submit a repair procedure for repairing mounting surfaces for City approval prior to repairing any parts. **[CDRL 8-7]**

8.5 Weld Repairs of Clearance Holes

1. Except with written City approval, this Section is not applicable for stamped or forged parts; parts fabricated from quench and tempered, thermo-mechanically processed, or precipitation hardened materials; or any clearance hole that cannot be brought into full conformance with OEM requirements after welding and machining.
2. Nonconforming clearance holes shall be prepared for welding by grinding, if necessary. The clearance hole and surrounding area shall be free from scale, oil, dirt, and other extraneous matter.
3. The structure being welded shall be held securely during welding to prevent distortion.
4. Welding shall be performed using arc welding or City approved welding process.
5. Welding consumables such as electrode, shielding gas, and backing shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. Welding consumables are subject to City review.
6. Preheat and inter-pass temperature shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
7. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard and the requirements of Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
8. The clearance hole shall be closed by welding, either partially or completely, such that it can be reamed to meet the specification requirements for diameter, circularity, and surface finish.
9. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
10. MT and VT shall be performed to identify defects such as cracks, lack of fusion, porosity, slag inclusions, or undercut.
11. Defects found shall be removed and repaired using a City approved procedure.
12. Following any specified heat treatment, the welded hole shall be finished by reaming. The diameter and circularity measurements of the clearance hole shall be repeated to verify compliance with the specification requirements.
13. Wherever MT inspection is required, VT inspection shall also be performed. For non-ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.
14. The Contractor shall submit a repair procedure for repairing clearance holes for City approval prior to repairing any parts. **[CDRL 8-8]**

8.6 Repair of Threaded Holes

8.6.1 General

Except with written City approval, weld repairs of threaded holes are not applicable for stamped or forged parts; parts fabricated from quench and tempered, thermo-mechanically processed, or precipitation hardened materials; or any threaded hole that cannot be brought into full conformance with OEM requirements after welding, drilling, and tapping.

8.6.2 Threaded Inserts

1. Where welding repairs are not applicable, or hot work would present an unacceptable risk of deformation or damage to the part, the Contractor may propose the use of threaded inserts to repair damaged threaded holes.
2. The application and type of threaded insert used shall be approved by the City on a case-by- case basis.
3. Threaded inserts shall be installed following the manufacturer's installation instructions.
4. Threaded inserts shall be sufficiently locked to prevent undesired movement of the insert.
5. The Contractor shall submit, for City review and approval, a procedure for repairing threaded holes using threaded inserts, including requirements for drilling/reaming, tapping, and installing the threaded inserts. The Contractor's procedure shall reference the manufacturer's installation instructions. **[CDRL 8-9]**

8.6.3 Weld Repairs of Threaded Holes

1. Where welding repairs are applicable, nonconforming threaded holes shall be prepared for welding by drilling, reaming, or grinding sufficient to achieve complete weld penetration and a defect-free weld. The clearance hole and surrounding area shall be free from scale, oil, dirt, and other extraneous matter.
2. The structure being welded shall be held securely during welding to prevent distortion.
3. Welding shall be performed using arc welding or City approved welding process.
4. Welding consumables such as electrode, shielding gas, and backing shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. Welding consumables are subject to City review.
5. Preheat and inter-pass temperature shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
6. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard, and the requirements of Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
7. The threaded hole shall be closed by welding, either partially or completely, such that it can be drilled and tapped to meet the specification requirements for thread profile.
8. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
9. MT and VT shall be performed to identify defects such as cracks, lack of fusion, porosity, slag inclusions, or undercut.

10. Defects found shall be removed and repaired using a City approved procedure.
11. Following any specified heat treatment, the welded hole shall be finished by drilling and tapping. Checking of the threads using a go/no-go gauge shall be repeated to verify compliance with the specification requirements.
12. Wherever MT inspection is required, VT inspection shall also be performed. For non- ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.
13. The Contractor shall submit a repair procedure for weld repair of threaded holes for City approval prior to repairing any parts using this process. **[CDRL 8-10]**

8.7 Weld Repairs of Secondary Brackets

1. The base material shall be prepared for welding by cutting or grinding. Existing brackets shall be removed from the base material and remaining weld deposit shall be ground flush to the surface. The repair area shall be free from scale, oil, dirt, and other extraneous matter.
2. Jigs or fixtures shall be used to accurately position secondary brackets. The structure being welded shall be held securely during welding to prevent distortion.
3. The secondary bracket shall be welded to the base material using weld preparation and joint geometry consistent with OEM requirements.
4. Welding shall be performed using arc welding or City approved welding process.
5. Welding consumables such as electrode, shielding gas, and backing shall be in accordance with OEM requirements, where applicable, the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. Any welds between carbon or low alloy steel and stainless steel shall be performed using an electrode capable of producing an austenitic stainless-steel weld deposit. Welding consumables are subject to City review.
6. Preheat and inter-pass temperature shall be in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard for the material(s) being welded. In no case shall the preheat temperature be less than 4.5°C (40°F) or the inter-pass temperature exceed 288°C (550°F).
7. All welding repairs shall be performed by qualified welders using qualified procedures in accordance with the latest revision of AWS D1.1, D1.3, or other City approved industry standard, and the requirements of Section 8.8. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
8. Where possible, welding shall be performed in the flat position. All other positions require additional weld and welder qualifications. Vertical welding is permitted only in the up direction.
9. All welds shall be cooled in still air. Forced cooling of any pass or completed weldment shall not be permitted.
10. MT and VT shall be performed to identify defects such as cracks, lack of fusion, porosity, slag inclusions, or undercut.
11. Defects found shall be removed and repaired using a City approved procedure.
12. As a final operation, all welds and ½ inch of the parent material on each side of the welds shall be peened.
13. Wherever MT inspection is required, VT inspection shall also be performed. For non-ferromagnetic materials such as aluminum alloys, copper alloys, or austenitic stainless steel, PT shall be used in place of MT. All NDT inspection shall be performed in accordance with Section 8.1.
14. The Contractor shall submit a repair procedure for replacing secondary brackets for City approval prior to repairing any parts. **[CDRL 8-11]**

8.8 Weld Qualifications

1. All welds shall be performed using qualified Weld Procedure Specifications (WPS) in accordance with the requirements of the latest revision of AWS D1.1, D1.3, ASTM A488, or other City approved industry standard.
2. All WPS shall be qualified by the Contractor or Subcontractor who will be performing the welds. Qualification samples shall be welded at the Contractor or Subcontractor's facility using the procedures, consumables, and welding equipment that will be used for all welds performed during the Truck Overhaul.
3. Backing material, if used, shall be the same as for welds performed during the Truck Overhaul.
4. Weld qualifications shall include impact toughness testing performed using Charpy V-Notch specimens. Impact toughness in the weld heat affected zone (HAZ) shall be greater than 27J (20ft-lbs) at -30°C (-22°F).
5. Weld qualifications shall be recorded on a Procedure Qualification Record (PQR) providing the weld parameters used and results of all tests and inspections performed in support of the qualification.
6. The use of a WPS purchased from AWS or any other source is not permitted. Pre-qualification and use of pre-qualified welds and welding procedures is not acceptable.
7. All welders shall be qualified in accordance with the requirements of the latest revision of AWS D1.1, D1.3, ASTM A488, or other City approved industry standard. Written welder qualification test records (WQTR) shall be made available for review at the City's request.
8. All WPS and PQR, along with specifications for purchase of welding consumables, shall be submitted for City approval prior to performing any welding on City owned equipment. **[CDRL 8-12]**

8.9 Straightening

1. Where possible, straightening shall be used to correct dimensional nonconformities. The Contractor shall be responsible for determining the applicability of cold or hot straightening and ensuring that straightening operations do not cause cracking, tearing, or other defects in the part being straightened.
2. Cold straightening shall be used to correct minor dimensional nonconformities only.
3. Hot straightening shall be used to correct larger dimensional nonconformities.
4. The following requirements apply to hot straightening:
   a. The Contractor shall set maximum limits for straightening temperature, based on industry standards or testing performed by the Contractor, for each material that that will be hot straightened. The maximum straightening temperature shall not cause residual changes to the mechanical properties of the material being straightened. For quench and tempered materials, the straightening temperature shall not exceed the tempering temperature.
   b. Temperature measurements shall be performed by means of contact or non-contact thermometers. If non-contact thermometers are used, calibration shall be performed at the maximum straightening temperature for each combination of material and surface finish.
   c. If heating is applied using a torch, nozzles and heating technique shall be such that temperature gradients are limited, and heating is distributed across the part being straightened. Localized melting of the material surface shall not be permitted.
   d. If heating is applied using a torch, the torch shall be adjusted for a neutral flame. Carburizing flames shall not be permitted.
   e. All parts shall be cooled in still air following hot straightening. Forced cooling shall not be used.

5. After cold or hot straightening, the entire straightened part shall be visually inspected. Additionally, MT or PT shall be performed surrounding the locations of force application, mechanical fixation, and heat application, if used. All NDT inspection shall be performed in accordance with Section 8.1.
6. The locations of force application, mechanical fixation, and heat application shall be recorded, along with inspection results, and included in the Truck History Books provided by the Contractor per Section 10.10.
7. If defects are found after straightening, the City shall be notified immediately, and the Contractor shall develop a repair procedure. The repair procedure shall be submitted and approved by the City in writing prior to the Contractor starting repairs.
8. The Contractor shall submit a straightening procedure, including maximum temperature limits where applicable, for City approval prior to performing any straightening operations. **[CDRL 8-13]**

8.10 Stress Relief Heat Treatment

8.10.1 Local Heat Treatment

1. Truck frames shall be held securely during stress relief heat treatment to prevent distortion.
2. Heat treatment stress relief processes shall utilize equipment capable of accurately controlling, monitoring, and recording temperatures throughout the heat treatment area with the ability to calibrate for maximum accuracy.
3. Thermocouples shall be spot welded directly to the surfaces to be heat treated. If multiple areas will be heat treated simultaneously, at least one thermocouple shall be used at each location. The control system shall have a sufficient number of heating elements and temperature measuring devices to accurately measure and correct temperature deviations within the heat treatment area to ± 50°F for each process step.
4. Wrap the area to be heat treated with electric heating elements. Heating elements shall extend past the area to be heat treated equally in all directions to ensure uniform temperature across the area being heat treated.
5. Wrap the heating elements with an insulating blanket. Extend the insulating blanket past the heating elements equally in all directions to establish a gradient control band. Where possible, insert insulation inside of closed sections to ensure uniform heating through the thickness of the shell around the closed section.
6. Heat treatment shall be performed as follows:
   a. Ramp temperature from room temperature to between 1075°F and 1125°F at no more than 400°F per hour.
   b. Hold between 1075°F and 1125°F for ½ hour.
   c. Ramp temperature back to room temperature at no more than 300°F per hour.
7. Visual inspection and NDT surface inspection (MT or PT) shall be performed on all locally heat-treated areas in accordance with Section 8.1.
8. A local heat-treating procedure shall be submitted for City review prior to heat treating any parts. **[CDRL 8-14]**
9. Temperature profiles from stress relief heat treatment shall be included by the Contractor as part of the Truck History Books per Section 10.10.
10. Stress relief using a manual torch shall not be permitted.

8.10.2 Furnace Heat Treatment

1. Truck frames shall be held securely during stress relief heat treatment to prevent distortion.
2. The furnace shall utilize equipment capable of accurately controlling, monitoring, and recording temperatures throughout the heat treatment area with the ability to

calibrate for maximum accuracy. The furnace temperature shall be controlled by the thermocouples spot welded to the part being heat treated, not by the air temperature in the furnace.

3. Thermocouples shall be spot welded directly to the surfaces to be heat treated. Multiple thermocouples shall be used per part to monitor the temperature distribution across the part.
4. Insert the part to be heat treated into the furnace at a location that ensures uniform heating of the part. If multiple parts are being heat treated simultaneously, they may not be stacked directly on top of one another.
5. Heat treatment shall be performed as follows:
   a. Ramp temperature from room temperature to between 1075°F and 1125°F at no more than 400°F per hour.
   b. Hold between 1075°F and 1125°F for ½ hour.
   c. Ramp temperature back to room temperature at no more than 300°F per hour.
6. Visual inspection shall be performed on all furnace heat treated parts in accordance with Section 8.1.
7. A furnace heat treating procedure shall be submitted for City review prior to heat treating any parts. **[CDRL 8-15]**
8. Temperature profiles from stress relief heat treatment shall be included by the Contractor as part of the Truck History Books per Section 10.10.

8.11 Painting and Corrosion Protection

1. The Contractor is responsible for ensuring that all components have sufficient protection against corrosion under the expected service and environmental conditions. To demonstrate compliance with this requirement, the Contractor shall develop a Corrosion Protection Plan that incorporates all Specification and OEM requirements, along with general requirements for items not covered by the Specification or OEM documentation. The Corrosion Protection Plan shall be submitted for City approval and shall, at a minimum, include the following information. **[CDRL 8-16]**
   a. Type of primer, paint, powder coat, sealant, anti-seize, plating, passivation, or other means of corrosion protection used for each component.
   b. Technical and safety data sheets for all primers, paints, sealants, anti-seize, or other chemicals used.
   c. Coating, anti-seize, and sealant configuration, showing the application locations and types of coatings, anti-seize, and sealants used.
   d. Procedures for each coating and sealant process, including surface preparation, temperature and humidity, coating thickness, and drying time requirements.
   e. Record sheets for each coating and sealant process.
   f. Coating and/or plating adhesion test results.
2. Unless otherwise required by this Specification or OEM documentation, exterior surfaces of the truck, bolster, and all truck-mounted or bolster-mounted components shall be coated using zinc chromate alkyd primer with compatible black enamel, or City-approved alternate coating system. The coating system shall not conceal structural cracks that may develop in service.
3. Unless specifically noted otherwise, equipment mounting locations, bearing surfaces, clearance holes, threaded holes, ground pads, nameplates, and other areas that are at risk for embedment or wear particulate formation shall not be coated.
4. Prior to performing any coating process, surfaces not to be coated shall be masked or covered to prevent inadvertently coating the surface due to overspray or runs.
5. Prior to performing any coating, surfaces to be coated shall be cleaned of all oil, dirt, dust, and other foreign matter to a level necessary to meet the coating manufacturer's

surface preparation requirements.

6. Coatings shall be applied as recommended by the manufacturer using the number of coats recommended by the manufacturer. Dry film thickness shall meet the manufacture's recommendations.
7. Coating adhesion shall be tested per the latest revision of ASTM D3359 on a sample of each combination of base material and coating system using the same surface finish and coating process that will be used for repairs. Adhesion shall achieve a maximum rating as provided by the coating manufacturer.
8. Sealant shall be applied per the OEM configuration, except that any additional areas deemed by the Contractor or City to pose a risk for water intrusion shall be sealed.
9. Prior to applying sealant, surfaces to be sealed shall be cleaned of all oil, dirt, dust, and other foreign matter to a level necessary to meet the sealant manufacturer's surface preparation requirements.
10. Joints between dissimilar metals shall be protected against galvanic corrosion by isolating the dissimilar metals using a City approved process.
11. Unless otherwise required by this Specification or OEM documentation, zinc plating shall be in conformance with ASTM B633 for service condition SC2, SC3, or SC4 with a Type II or Type VI finish.
12. Other plating processes may be submitted for City approval, provided they are able to withstand a minimum of 96 hours salt spray exposure without developing red rust or visible corrosion products. Salt spray testing shall be performed in accordance with ASTM B117.
13. Passivation or other means of corrosion protection shall be performed in accordance with a City approved industry standard.

8.12 Grit Blasting

1. Grit blasting shall be performed using non-destructive ceramic media such as ceramic beads, DuPont Star Blast, or other City-approved ceramic medium with rounded to sub-angular grains. Aluminum Oxide is not an acceptable grit blast medium.
2. Prior to grit blasting, all surfaces not to be blasted shall be protected to prevent damage from overspray.
3. Unless specifically noted otherwise, equipment mounting locations, bearing surfaces, clearance holes, threaded holes, ground pads, nameplates and other areas where a smooth surface finish is required shall not be grit blasted.
4. The Contractor shall submit a grit blasting procedure for City approval prior to grit blasting any parts. **[CDRL 8-17]**

8.13 Cleaning and Stripping

1. All truck components shall be cleaned of oil, grease, dirt, dust, and other foreign matter.
2. Paint shall be stripped from truck components as required by this Specification.
3. Cleaning and stripping may be achieved through chemical or mechanical means.
4. Where cleaning and stripping are achieved through mechanical means, care shall be taken not to damage the surface being cleaned or stripped. The final surface finish shall be in accordance with OEM requirements.
5. Where cleaning and stripping are achieved through chemical means, the chemical being used for cleaning or stripping shall be compatible with the surface being cleaned or stripped. Any nearby components that may be damaged by the cleaning or stripping chemicals shall be protected to prevent contact with the chemicals.
6. All surrounding locations that do not require cleaning or stripping shall be adequately protected during the cleaning and stripping operations.
7. Cleaning and stripping processes shall achieve cleanliness appropriate for the

application.

8. For coating or sealant applications, cleanliness shall be in accordance with the coating or sealant manufacturer's recommendations.
9. For welding applications, cleanliness shall be in accordance with the applicable AWS code.
10. Cleanliness shall meet OEM requirements where available.
11. For other applications, cleanliness shall be in accordance with a City-approved SSPC or NACE standard.
12. The Contractor shall submit a Cleaning and Stripping Plan for City approval prior to cleaning or stripping any parts. **[CDRL 8-18]**

8.14 Ground Pad Inspection and Repair

1. Ground pads shall be inspected for damage, pitting, or surface contamination. All ground pads shall be restored to a nominally flat surface finish without removing the protective plating.
2. Nonconforming ground pads shall be replaced per the applicable OEM drawings.
3. Any ground pads with damage or pitting exposing bare copper material shall be removed and replaced per the applicable OEM drawings.
4. The Contractor shall submit a ground pad inspection, cleaning, and replacement procedure for City review and approval. **[CDRL 8-19]**

8.15 Hydraulic System Leak Testing

1. Prior to performing the leak test, the hydraulic system shall be filled with hydraulic fluid and bled to remove any air within the system.
2. The accumulators shall be pre-charged with nitrogen according to RMS Section 1300, Appendix B.
3. To perform a hydraulic system leak test, allow the hydraulic pump to fully charge the system. At the moment the pump cuts out, record the hydraulic pressure of the system.
4. After allowing the system to rest for ten (10) minutes, record the system pressure a second time and inspect all piping, hoses, fittings, and valves for evidence of leakage.
5. The difference between the first and second pressure measurement at each accumulator shall be no greater than 5% and there shall be no evidence of fluid leakage. The hydraulic pumps shall not start during the ten-minute test period.
6. If the pressure drop exceeds allowable limits, the system shall be re-inspected for evidence of fluid leakage.
7. Depressurize the hydraulic system and measure the accumulator pre-charge.
8. If the dry nitrogen pressure is not within the required temperature compensated OEM tolerances, the new accumulator is considered defective and shall be replaced with a new OEM accumulator. Retest.
9. All fluid leakage identified shall be repaired by reassembling or replacing components as necessary and the hydraulic system leak test shall be repeated until the requirements are met.
10. New accumulators shall be marked with a white stripe indicating that they have been pressurized with dry nitrogen to OEM recommended pressure.
11. The Contractor shall submit a procedure for hydraulic system leak testing, including test pressures and acceptance criteria, for City review and approval. **[CDRL 8-20]**

8.16 Identification Plate

1. Identification plates shall be removed or protected prior to cleaning. The identification plates shall be cleaned, repainted, and reinstalled in the original location.
2. Prior to removing the identification plates, if removed, the serial number of each

component shall be clearly identified by means of a tag or other method.

3. The refurbishment date and Contractor's or Subcontractor's name or logo shall be added to the existing identification plates or to additional plates that are installed by the Contractor or Subcontractor.
4. The additional plates, if required, shall be mounted so as not to be obscured by the wheel, rotating member, or any other truck component when installed on the truck frame.
5. After installation, identification plates shall be masked until the truck is returned to the City.
6. The Contractor shall submit the identification plate configuration and subcontractor's plate configuration for City review and approval.

8.17 Dimensional Inspection

1. Dimensional inspections shall be performed by qualified personnel using tools with sufficient accuracy and precision to identify conforming and nonconforming components. Inspection tools shall be kept in current calibration in accordance with Section 9.4.
2. Dimensional inspection acceptance/rejection criteria shall be in accordance with the OEM requirements. At a minimum, the following items shall be inspected:
    a. Where specified, surface finish, flatness, and profile shall be inspected.
    b. Clearance holes for equipment mounting shall be inspected for diameter and circularity.
    c. Machined bores, bosses/pins, and guide shafts shall be inspected for diameter, depth/length, circularity, concentricity, and surface finish.
    d. Rotating shafts shall be inspected for diameter, runout, and if applicable taper.
    e. Threaded holes and bosses shall be inspected for damaged, oversized, or undersized threads using go/no-go gauges. Unless otherwise specified by the OEM, threaded holes and bosses shall conform to the dimensional requirements of ASME B1.1, Class 2.
3. Where specified or included on OEM drawings, parallelism, perpendicularity, and concentricity shall be inspected.
4. Dimensional inspection shall check for bent or distorted components.
5. Procedures calling for dimensional inspection shall show the dimension to be measured, list the tool to be used for inspection, and provide nominal, minimum acceptable, and maximum acceptable values for each dimensional measurement.
6. The results of all dimensional measurements shall be recorded in the Truck History Books provided by the Contractor per Section 10.10.

8.18 Electrical Wiring

1. All wiring shall be performed by qualified, experienced wiring personnel using appropriate tools for stripping insulation, cutting, tinning, soldering, harness making, attaching terminals, and other wire fabrication tasks.
2. Wire shall be protected from damage during all phases of equipment manufacture.
3. Wire shall not be walked on, dragged across sharp or abrasive objects, kinked or twisted, or otherwise mishandled.
4. The ends of wire shall not be permitted to lay on wet floors or other damp areas where moisture may be absorbed into the conductors.
5. There shall be no nicks in the insulation of any wire or cable.
6. Wire and cable with nicked or otherwise damaged insulation shall be replaced.
7. In isolated cases, a repair procedure may be proposed in lieu of replacement, subject to review and approval of the City. Such approval will not be granted for Teflon-based insulation or where the depth of the nick is greater than 50 percent of the insulation thickness.

8. When removing insulation, wire strands shall not be nicked or broken in excess of the limits of FAA Specification No. AC 43.13-1A, Section 449, “Stripping Insulation.” Additionally, the following criteria shall apply:
   a. Wires smaller than AWG No.10 shall have no nicked or broken strands.
   b. AWG No.10 through AWG 1/0 shall be allowed 7.4 percent nicked strands.
   c. Above AWG 1/0 through 1600/24 shall be allowed 4.4 percent nicked strands.
   d. Above AWG 1600/24, nicked strands shall be allowed on a graduated scale.
9. Definitions: A broken strand shall count as two nicked strands. A nick is defined as 25 percent or more of the strand area damaged or cut more than 33 percent of its diameter. Longitudinal scratches in a copper strand are not considered cause for rejection.
10. Cable conductors shall be clean prior to installation of terminals, lugs, or connectors.
11. Terminals, lugs, and connectors shall be attached to the wiring using the proper crimping tools and dies recommended by the manufacturer. Only one wire shall be crimped in any one terminal. All terminations are required to pass a pull test.
12. Swaging tools shall be of a type that ensures complete swaging in every case.
13. If used, solder shall be in accordance with ASTM B32, Grade Sn60. A non-corrosive flux shall be applied immediately before soldering.
14. All terminals shall be properly torqued to assure sound connections.
15. Conductors which may be subjected to motion relative to the terminal shall be protected by suitable means to prevent breakage of the conductor at or near the terminal.
16. Wires and cables shall not be allowed to chafe or rub against any part of the truck, wireway, conduit, or each other.
17. Wire and cable dress shall allow for sufficient slack at equipment terminals to provide for movement induced by shock and vibration, equipment shifting, alignment, cover removal, and component replacement.
18. A drip loop shall be provided on all exposed wires and cables to prevent fluid runoff into connected equipment.
19. Pulling compound, is used, shall be non-conductive, non-hygroscopic, non-odorous, shall not support bacterial activity, nor attract vermin.
20. Electrical tape shall not be PVC. Electrical tape shall meet or exceed the voltage rating of wire where the tape is applied.
21. An anti-corrosive grease shall be applied to the contacting surfaces of all ground connections.
22. Wire-tying devices shall be of such material and construction that they will adequately retain the wires for the life of the wiring and shall be resistant to ozone and ultraviolet light.
23. Wire and cable ties shall be trimmed and located to eliminate any hazard to personnel or risk of chafing/cutting adjacent wires due to sharp edges.
24. Wire-tying devices shall be snug but shall not be so tight as to cause indentation and cold flow damage to insulation.
25. Wire-tying devices shall be mechanically fastened to a permanent structure. Adhesive-installed mounting bases shall not be used for ties or for cable support.

8.19 Electrical Testing

8.19.1 General

The Contractor shall submit an electrical testing procedure, including acceptance criteria and test voltage/time, for City review and approval. **[CDRL 8-21]**

8.19.2 Wiring Continuity

All circuits shall be tested to ensure continuity and correct polarity of equipment and devices. All frame grounds and terminal connections shall be checked for tightness.

8.19.3 Insulation Resistance

1. Insulation resistance tests shall be conducted on all electrical wiring and connections per IEEE Std 16-2004. Tests shall be conducted to verify the state of the insulation to the case or frame.
2. The following insulation resistance limits shall apply when all circuits of a given voltage class are connected in parallel under all environmental conditions, including high humidity. Measurements shall be taken after applying constant voltage for 1 minute.
3. Where the nominal circuit voltage is below 90 V, the minimum insulation resistance shall be 2 megaohm at 500 Vdc.
4. Where the nominal circuit voltage is 90 to 300 V, the minimum insulation resistance shall be 4 megaohm at 1000 Vdc.
5. Where the nominal circuit voltage is above 300 V, the minimum insulation resistance shall be 5 megaohm at 1000 Vdc.

8.19.4 High Potential Tests

1. High potential tests shall be conducted only once the insulation resistance tests are completed and passed per IEEE Std 16-2004. Tests shall be conducted to verify the state of the insulation to the case or frame.
2. The test shall be conducted by applying the test voltage, as listed below, for a period of 1 minute, across the insulation being tested. The test is passed if there is no insulation breakdown or excessive leakage current. The test voltage shall be at a frequency of 50 or 60 Hz with a sinusoidal waveform. Alternatively, the test voltage can be dc with a value equal to 1.414 times the ac rms voltage. In the formula below, V shall be the nominal system voltage for a circuit.
3. For new wires and cables, if the nominal circuit voltage is below 300 V, the test voltage shall be 2*V + 1000 Volts. For reused wires and cables, and repeated testing of new wires and cables, derate the applied test voltage by 0.85.
4. For new wires and cables, if the nominal circuit voltage is equal to or above 300 V, the test voltage shall be 2.25*V + 2000 Volts. For reused wires and cables, and repeated testing of new wires and cables, derate the applied test voltage by 0.85.

8.20 Flammability, Smoke Emission, and Toxicity Requirements

8.20.1 General

Combustible material used in the construction of the trucks shall satisfy the flammability, smoke emission, and toxicity requirements cited in this Section.

8.20.2 Fire Performance

1. At a minimum, new combustible materials used in the construction of the trucks shall be tested to confirm that they meet the fire performance requirements of NFPA 130 Chapter 8, Vehicles.
2. A series of fire performance analyses shall be performed **[CDRL 8-22]** to verify that these requirements are fully met, including the following:
   a. Materials flammability matrix

b. Heat release rate calculations
c. Independent laboratory test reports demonstrating compliance for new combustible materials.

8.20.3 Toxicity

1. Those materials and products generally recognized to have highly toxic products of combustions shall not be used.
2. Material tested in accordance with NFPA 130, Chapter 8, Vehicles, shall meet the following toxic gas release limits (ppm) as determined per BSS 7239 or SMP 800C:

Carbon Monoxide (CO)	3,500 ppm
Hydrogen Fluoride (HF)	200 ppm
Nitrogen Dioxide (NO_2)	100 ppm
Hydrogen Chloride (HCl)	500 ppm
Hydrogen Cyanide (HCN)	150 ppm
Sulfur Dioxide (SO_2)	100 ppm

9 QUALITY ASSURANCE AND CONFIGURATION CONTROL

9.1 Project Quality Assurance Plan (PQAP)

1. To provide a quality product to the City, the Contractor shall have planned and established a documented quality assurance program in compliance with ANSI/ISO/ASQ Q9001-2008 or latest revision, and FTA Quality Management System Guidelines, FTA-PA-27-5194-12-1.
2. The Contractor shall apply the principles of the appropriate ISO 9000 series processes or equivalent and enforce the elements of the quality assurance program within all parts of its organization and with all manufacturers, subcontractors, and suppliers performing Contract work.
3. Quality system documentation must be consistent with the skills needed, methods used, and training resident among personnel performing Contract work in accordance with the requirements of this specification.
4. The Contractor shall submit for City review and approval its proposed Project Quality Assurance Plan (PQAP). **[CDRL 9-1]**
5. This Plan must identify the controls, resources, and skills the Contractor will apply to satisfy project quality system requirements.
6. For each specified quality system requirement, the Plan must identify how it will be satisfied, when, where, and by which job function.
7. It must include a flow chart of the manufacturing and overhaul sequence with all planned inspections, hold points, and customer witness points indicated. The chart shall indicate entities participating in the inspections.
8. Required inspection equipment, measurements, personnel certifications, workmanship acceptance standards, methods of inspection, and quality record documentation shall be identified in the PQAP.
9. The PQAP may refer to specific sections of other Contractor documents, such as the Quality Manual and supporting procedures, if such documents are applicable to this project.
10. The City shall be notified of all customer witness point inspections and provided with an opportunity to witness these inspections. However, work may proceed beyond said inspection without written authorization from the City. The City reserves the right to institute at any time additional customer witness point inspections.
11. The City reserves the right to institute at any time customer-witnessed hold-point inspections. If customer-witnessed hold-point inspections are instituted, the Contractor may not proceed beyond said inspection prior to receiving written authorization from the City.
12. The City reserves the right to perform random in-process inspections.

9.2 Process Control

1. A significant part of the Contractor's quality and overhaul program shall be to prevent problems by controlling the applicable overhaul and repair processes, thereby lessening the demands on required inspection and correction activities. To this end, the Contractor shall identify and plan processes necessary to produce, under controlled conditions, products, and services of the specified quality.
2. The Contractor shall prepare documented instructions and workmanship criteria and monitor and approve production processes.
3. Production equipment and processes must be maintained as necessary to ensure that products satisfy specified requirements.

9.3 Material Procurement and Control Plan

1. The Contractor and all Subcontractors shall establish and utilize procedures for control of components/assemblies provided by the City, fabricated by the Contractor or Subcontractor, or procured by the Contractor or Subcontractor.
2. The Contractor and all Subtractors shall submit for City review and approval a Material Procurement and Control Plan defining procedures and processes that will be utilized by the Contractor and all Subcontractors for material procurement and control. **[CDRL 9-2]** At a minimum, the plan must identify procedures and processes for the following:
   a. Configuration Control, to prevent purchase or use of incorrect or obsolete components/assemblies.
   b. Material Availability, including base stock quantity, lead time, and re-order quantity for each component/assembly.
   c. Receiving Tests or Inspections, to prevent use of defective material purchased or fabricated by the Contractor or Subcontractor. Acceptance criteria shall be identified for all tests or inspections.
   d. Requirements must be provided for additional testing if nonconforming materials are identified.
   e. Material Identification and Accountability, through all stages of the overhaul process. Individual components/assemblies or lots shall retain unique identification and indicate their acceptance, rejection, or uninspected status.
   f. Control and Disposition of Nonconforming Materials, to prevent inadvertent use or installation of defective components/assemblies.
      Suppliers of nonconforming material shall be notified of the nonconformance and the Contractor shall work with the Supplier or identify a new Supplier to prevent recurrence of the defect.

9.4 Control and Calibration of Measurement Tools and Test Equipment

1. Measurement tools and test equipment must be kept in current calibration over the length of the Contract. The Contractor and any Subcontractors shall establish and utilize control and calibration procedures to ensure that only calibrated measurement tools and test equipment are used.
2. The method and period of recalibration must be in accordance with a recognized national standard.
3. The Contractor and any Subcontractors shall keep on file a certification of calibration for all measurement tools and test equipment.
4. Calibration status, including calibration due date, must be marked on all measurement tools and test equipment.
5. Inspection and test records must include the identification and calibration status of all measurement tools and test equipment used.
6. Measurement tools and test equipment must be suitably stored to ensure continued accuracy and fitness for use.
7. Control and calibration procedures must contain provisions for determining the validity of previous measurements and tests and taking appropriate corrective action if measurement tools or test equipment are found out of calibration.

9.5 Inspection and Test Status

The Contractor shall identify by suitable means the inspection and test status of products throughout the work process so that only acceptable parts are used. The Contractor's Project Quality Assurance Plan must identify the inspection authority responsible for releasing parts as conforming at each stage of the work.

9.6 Controlling Nonconforming Products and Services

The Contractor shall establish and maintain a procedure to prevent the inadvertent use of nonconforming materials. Nonconforming materials must be segregated from acceptable items. In any case, the Contractor remains solely responsible to prevent unauthorized use of nonconforming material.

9.7 Corrective and Preventive Action

1. The difference between *corrective* and *preventive* action must be clearly expressed in the Contractor's Project Quality Assurance Plan.
2. Corrective Action procedures must address actual nonconformities that have occurred.
3. Preventive Action procedures must address the potential for nonconformity to occur in the future.
4. The Contractor shall establish and maintain procedures for taking corrective and preventive action that is appropriate to the size of the problems and commensurate with the risks that they present.
5. Corrective Action procedures must be effective in handling complaints from nonconformance reports and from all entities, including CATS. Methods must include problem analysis, recording results, determining the most effective corrective action, verifying that corrective actions have been taken, and that they are effective.
6. Preventive Action procedures must require use of all available information to eliminate potential sources of nonconformity. Methods must include data and information analysis, determining the best approaches to preventing nonconformity, implementing and ensuring effectiveness of preventive action plans, and forwarding significant details of actions taken for review by management.

9.8 Use of Statistical Techniques

Statistical quality control applications used in acceptance of parts, materials, or processes by the Contractor or its suppliers must be fully documented and based on generally recognized and accepted statistical quality control methods and defined in the Contractors Project Quality Assurance Plan.

9.9 Documentation

All reports, plans, programs, procedures, schedules, and other materials prepared for the Contract work to be performed by the Contractor or any Subcontractors must be made available to the City. The City shall be entitled to copies and access to these materials during the progress of the Contract. All such reports, plans, programs, procedures, schedules, and other materials must be readily accessible to the City.

9.10 Inspection and Test Plan

1. Inspection and testing are used as a means for the Contractor to demonstrate Specification compliance to the City. The Contractor shall submit an Inspection and Test Plan for review and approval by the City. **[CDRL 9-3]**
2. The Inspection and Test Plan must include a comprehensive list of all inspection and testing to be performed before, during, and after truck overhaul, including references to the written inspection and test procedures.
3. The Contractor shall establish and maintain written procedures for inspection and testing activities, including requirements for function and performance verification/validation. All Inspection and Test procedures must be submitted to the City for review and approval. **[CDRL 9-4]**
4. Procedures must identify all measurement tools and test equipment required to perform the inspection or test.
5. Acceptance criteria must be identified for all inspections and tests.

6. Records must be kept of all inspection and testing results before, during, and after overhaul to provide objective evidence that specified product requirements have been met. This includes all in-process inspections and tests, as well as the receiving inspection, pre-shipment inspection, and first article inspection. The arrangement and content of the record forms must be approved by the City as part of the Inspection and Test Plan.
7. Records must include actual results of measurements taken and tests conducted.
8. Inspection and test records must include the identification and calibration status of all measurement tools and test equipment used.
9. Inspection and Test records must be included in the Truck History Books, reference Section 10.10.

9.10.1 Outbound Inspection

1. The City will perform an outbound inspection to document any missing or damaged items prior to the truck leaving City property.
2. The inspection report will be provided by the City to the Contractor for each truck and bolster at time of shipment. A copy of the document will accompany the truck and the original will be retained by the City.
3. The report will include a description of the items included in the shipment and, where available, the identifying serial number(s).
4. The report will note any damage found during outbound inspection that requires repairs beyond the scope of this Specification. Such items will be considered Hidden Damage and must be repaired in accordance with Section 9.10.6.

9.10.2 Receiving Inspection

1. The Contractor shall conduct a comprehensive receiving inspection of each truck, bolster, and related components immediately upon arrival at its facility. This inspection must be conducted, and a report must be generated by the Contractor for each shipment at the time of delivery, prior to commencing overhaul. The report must be submitted to the City within five (5) business days of receipt of the trucks and bolsters at the Contractor's facility.
2. The receiving inspection report must include an inventory of all related components and comprehensive digital photographs of the trucks, bolsters, and related components in the as- received condition. Any discrepancies between the outbound inspection report and the receiving inspection must be noted.
3. The receiving inspection report must note any damage found during inspection that requires repairs beyond the scope of this Specification. Such items will be considered Hidden Damage and must be repaired in accordance with Section 9.10.6.
4. Each inspection report must be signed, and its accuracy verified by the Contractor's designated Quality Assurance representative.
5. The City must be notified of the receiving inspection and provided with an opportunity to witness the inspection.

9.10.3 Assembly First Article Inspection

1. A First Article Inspection (FAI) must be performed jointly by the City and the Contractor at the Contractor's facility on the first car-set of trucks: two (2) powered truck/bolster assemblies and one (1) center truck assembly.
2. The FAI must be performed on trucks and bolsters overhauled using approved processes, procedures, and tooling. The FAI must establish the standard of quality for the remainder of the Contract, as agreed to by the City and the

Contractor.

3. Inspection, functional testing, and burn-in testing must be performed per Sections 6 and 7 as part of the FAI to demonstrate compliance with all Specification requirements and completion of all overhaul work.
4. The Contractor shall submit an FAI package to the City for review and approval per the submittal schedule defined in Section 10.1. **[CDRL 9-5]** The FAI must not be conducted until the FAI package has been approved by the City.
5. All production work performed prior to approval of the FAI shall be at the Contractor's risk.

9.10.4 Component First Article Inspections

1. Component First Article Inspections (FAI) shall be performed jointly by the City, Contractor, and Subcontractor, if applicable, at the Contractor or Subcontractor's facility. Component FAIs shall be performed on at least one of each of the following components.
   a. Powered truck frame, powered truck bolster beam, and center truck frame.
   b. Traction Motor.
   c. Gearbox.
   d. Track Brake.
   e. Powered truck and center truck wheelsets.
   f. Powered truck and center truck brake calipers.
2. All Component FAIs must be performed and approved prior to the Assembly FAI.
3. The Component FAIs must be performed on components overhauled using approved processes, procedures, and tooling. The FAI must establish the standard of quality for the remainder of the Contract, as agreed to by the City, Contractor, and Subcontractor, if applicable.
4. All inspections and tests performed as part of the component overhaul must be performed as part of the Component FAI to demonstrate compliance with all Specification requirements and completion of all overhaul work.
5. The Contractor shall submit an FAI package to the City for review and approval at least two (2) weeks prior to the Component FAI. **[CDRL 9-6]** The FAI must not be conducted until the FAI package has been approved by the City.
6. All production work performed prior to approval of the FAI must be at the Contractor's risk.

9.10.5 Pre-Shipment Inspection

1. Each completed truck, bolster, and all related components must be properly prepared for shipping to ensure that no damage occurs during shipment.
2. Any unit not properly covered and protected from damage will not be accepted by the City and will be returned to the Contractor for repair at no additional cost to the City.
3. A pre-shipment inspection must be performed by the Contractor prior to shipping to confirm that all work has been completed, all components are included in the shipment, and all units have been appropriately prepared for shipping.
4. The City must be notified of the pre-shipment inspection and provided with an opportunity to witness the inspection.
5. A pre-shipment inspection report and Certificate of Compliance must be provided by the Contractor to the City for each truck and bolster at time of shipment. A copy of the report must accompany the shipment and the original must be retained by the Contractor.
6. The report must include a description of the items included in the shipment

and, where available, the identifying serial number(s).

9.10.6 Delivery Inspection

1. The City will perform a Delivery inspection on each overhauled truck, bolster, and all related components upon arrival at its facility to document any missing or damaged items as well as any discrepancies with the Pre-Shipment Inspection.
2. The report will note any damage found during the inspection that requires repair before the City takes Delivery of the truck or component for acceptance testing.
3. If no material defects or damage are found by the City during the Delivery Inspection, the City will issue a Certificate of Delivery to the Contractor.

9.11 Nonconforming Material Report (NCR) and Corrective Action Plan (CAP)

1. Whenever repairs or replacements are required due to nonconforming materials identified by the Contractor, a nonconforming material report (NCR) must be prepared. The NCR shall reference the inspection record in which the nonconformance was identified and list the corrective and preventive actions taken as a result of the nonconformance.
2. Corrective actions must be taken for all nonconforming materials identified by the Contractor.
3. Preventive actions must be taken for all nonconforming materials resulting from the Contractor's or any Subcontractors' work procedures or processes.
4. Multiple repairs or replacements performed on the same assembly may be grouped onto a single NCR to reduce the quantity of documentation generated for each truck.
5. The Contractor shall develop a Corrective Action Plan (CAP) for all repairs that are beyond the base scope of work defined in Section 5 (i.e. Hidden Damage repairs).
6. CAPs must include design details, work procedures, labor hours and associated costs, material costs, and all other information required to repair the nonconformance.
7. CAPs must be submitted for City review and approval along with the applicable NCR. Repairs may not be performed prior to approval of the CAP.
8. If necessary, the same CAP may be used by multiple NCRs over the course of the project.
9. Templates for Nonconforming Material Reports must be submitted for City review and approval. **[CDRL 9-7]**
10. Templates for Corrective Action Plans must be submitted for City review and approval. **[CDRL 9-8]**
11. NCRs and CAPs must be included in the Truck History Books required by Section 10.10.

10 CONTRACT MANAGEMENT

10.1 Truck and Spare Component Submittal Schedule

1. An initial submittal, including the items listed below, must be provided to the City within thirty (30) calendar days of Notice to Proceed (NTP).
   a. Project Quality Assurance Plan (See Section 9.1)
   b. Material Procurement and Control Plan (See Section 9.3)
   c. Correspondence Management Plan (See Section 10.6)
   d. Monthly Progress Report Template (See Section 10.8)
   e. Master Program Schedule (See Section 10.9)
2. The initial technical submittal, including the items listed below, must be provided to the City no later than sixty (60) calendar days from NTP.
   a. Inspection and Test Plan (See Section 9.10)
   b. NCR Template (See Section 9.11)
   c. CAP Template (See Section 9.11)
   d. Program Management and Overhaul Plan (See Section 10.2)
   e. Truck History Book Template (See Section 10.10)
3. Components/assemblies that are expected to have a long lead time must be identified in the first technical submittal.
4. To avoid project delays, the Contractor is encouraged to submit draft procedures, drawings, and/or schematics for these components/assemblies prior to the Preliminary Design Review Package.
5. The Preliminary Design Review (PDR) package, including the items listed below, must be provided to the City no later than one-hundred-twenty (120) calendar days from NTP.
   a. Draft versions of all Work Procedures (See Section 10.2) defined in the approved Program Management and Overhaul Plan.
   b. Draft versions of all Inspection and Test Procedures (See Section 9.10) defined in the approved Inspection and Test Plan.
   c. The Preliminary Design Review meeting must occur three (3) weeks after submittal of the PDR package.
6. The Final Design Review (FDR) package must be provided to the City no later than sixty (60) calendar days from approval of the PDR. The FDR package must include updated revisions of all documents submitted in the PDR package, along with any documents that may have been missing from the PDR package.
   The Final Design Review meeting must occur three (3) weeks after submittal of the FDR package.

10.2 Program Management and Overhaul Plan

1. The Contractor shall establish an organization to properly manage this Contract. The organization must be highly responsive to the needs of the City, as required by the Contract. The Contractor shall develop and submit a Program Management and Overhaul Plan to the City for review and approval. **[CDRL 10-1]** The Program Management and Overhaul Plan must describe all work required by this Specification and must include, but not necessarily be limited to:
   a. A description of the Contractor's overhaul methodology.
   b. An Organization Chart identifying all key personnel for the Contractor and Subcontractors. The Organizational Chart must define and describe roles and responsibilities, reporting structure, key positions, personnel and their respective duties

and responsibilities. Organizational charts must be revised, as required, for all phases of the Contract.

c. The internal methods and communications to be used to control the program schedule, technical performance, program changes, subcontracts, purchase orders, material procurement, and field service support.
d. A flowchart of all project tasks, indicating task integration.
e. A Compliance Matrix identifying items that require City approval or are otherwise deliverable under the terms of this Contract. The Compliance Matrix must list the Contractor's document that demonstrates compliance with the requirement or deliverable, the status of the document (reference Section 10.4), and a schedule showing when the document will be submitted or resubmitted to the City, unless already approved.
f. The Contractor's approach for developing work instructions, procedures, tooling, and inspection gages used to perform and control work within the scope of this Contract.
g. A list of all Work Procedures that will be used for performing work within the scope of this Contract. The arrangement and content of the work procedures must be approved by the City as part of the Program Management and Overhaul Plan.
h. A list of all Drawings, Schematics, Illustrated Parts Catalogs, and Maintenance Manuals that will be provided or updated under this Contract.
i. A Bill of Materials listing all components/assemblies used to complete all work within the scope of this Contract.
j. The name and scope of work for all Subcontractors that will be used under this Contract. Subcontractors are subject to City review and approval.

2. The Contractor shall submit all Drawings, Schematics, Illustrated Parts Catalogs, and Maintenance Manuals to the City for review and approval. **[CDRL 10-2]**

10.3 Design Review

1. Formal design reviews must be conducted per the schedule defined in Section 10.1. The Contractor's personnel responsible for the work under review must participate in the review.
2. The review process must be an iterative process that includes, at a minimum, Preliminary Design Review and Final Design Review. Each review must consist of documentation submittals, as specified in the technical specification, and formal presentations, demonstrations, and tests.
3. The reviews must be conducted by the Contractor and performed jointly with the City. Review agendas must be made available to the City along with the documentation package for that review.
4. The purpose of the design review is to ensure that the requirements of this Specification are met by the design. The design review process must be coordinated with the submittal review process defined in Section 10.1.
5. The Contractor's technical documentation submitted to support the design review must clearly define the systems, designs, overhaul and production processes, inspection and testing criteria, and compliance with the requirements of this Specification. Interfaces between the various systems and the attached apparatus, equipment, wiring, piping, and hardware must be clearly detailed in the technical documentation.
6. As a minimum, two (2) reviews must be conducted. Each review may require several iterations to complete. All action items, outstanding issues and requests for clarification from the previous design review must be satisfactorily resolved prior to

commencing next design review. All drawings must be prepared using a CAD format, approved by the City. All "as-built" drawings must be prepared in accordance with ANSI standards and must be submitted as electronic documents using a City approved format.

10.4 Submittal Review and Dispositions

1. The City will review each submittal, as furnished by the Contractor, within thirty (30) calendar days of its receipt. Upon completion of the review the City will notify the Contractor in writing of the status of the submittal with one of the following dispositions:
   a. Approved – The Contractor may proceed with the work addressed in the submittal. Any Approval by the City shall not relieve the Contractor from the responsibility to comply with all requirements of this Specification in all aspects of work.
   b. Conditionally Approved – The Contractor may proceed in accordance with changes indicated and shall revise and resubmit the document, drawing, and/or data for CATS Approval.
   c. Disapproved – The Contractor must not proceed with the work. The Contractor must revise and resubmit the submittal in its entirety. The revised submittal must address, to the satisfaction of the City, all the comments provided in the "Disapproved" disposition.
   d. Accepted for Information Only – This disposition is provided for submittals made to explain an "approved equal" concept, a general approach to the work, or other information-only submittal. The Contractor must not proceed with the work addressed in such submittals until the concept has been finalized, submitted, and "Approved."
2. The Contractor shall respond in writing to comments provided by the City within fifteen (15) calendar days of their receipt.
3. Any designs released for manufacture prior to receiving City approval are at the sole risk of the Contractor.

10.5 Changes

1. Requests for changes and "approved equal" must be made in writing to the City. Each request must include all pertinent information to verify that the item offered is equal to or exceeds the Specification requirements. Any test requirements in the Technical Specification that pertain to an item under consideration must be included in the request submittal package. The City may request sample components to facilitate the evaluation of the proposed alternative item. Such samples shall become the property of the City.
2. The City may request the Contractor to dismantle and/or functionally test such samples to establish the equality or superiority of form, fit, and function. The Contractor shall fulfill all such requests.

10.6 Correspondence Management Plan

1. The Contractor shall develop, maintain, utilize, and distribute a Correspondence Management Plan, which must identify stakeholder information needs, distribution methods, and status reporting requirements (such as status meetings, progress reports, project presentations, etc.). The Correspondence Management Plan is subject to City review and approval. **[CDRL 10-3]**
2. The plan must ensure general awareness of the program requirements among the Contractor, its Subcontractors, and the City and must include provision to report program milestones against those expectations.

10.7 Progress Review Meetings

1. Progress Review Meetings must be scheduled and attended by the Contractor and,

as required, any Subcontractors on a monthly basis to review progress of the project. Progress meetings must be used to summarize and review the Monthly Progress Reports (See Section 10.8), written correspondence exchanged since the last meeting, and open action items.

2. Progress Meeting Agendas must address the topics to be discussed during the meeting and must be distributed by the Contractor a minimum of five (5) working days in advance of the scheduled Progress Review Meeting.
3. The Contractor's authorized technical representative(s) shall also attend Progress Review Meetings as required to discuss technical aspects of the project and to review comments on documents. The Contractor's technical representatives shall be familiar with detailed design issues to facilitate quick resolution through discussion with the City's technical representatives. When appropriate, technical meetings shall be conducted as extensions to the progress meetings.

10.8 Monthly Progress Report

1. The Contractor shall prepare and submit a Monthly Progress Report to the City within seven (7) calendar days of the close of the previous month. The progress report must use a City approved template and be the focal point for each month's Progress Review Meeting. **[CDRL 10-4]**
2. The report must describe the budget status, progress during the report period, status of each truckset in the overhaul process, hidden damage component/assembly repairs and replacements, hidden damage account balances, projected activities for next report period, and actions required by the City.
3. The report must analyze causes for reported delays, explain reasons for any variances from the Master Program Schedule, and provide a plan and schedule for implementing appropriate corrective and preventive actions.

10.9 Master Program Schedule

1. The Contractor shall develop and maintain a Master Program Schedule (MPS) for the truck overhaul project. The program schedule must provide a graphical representation of the project and identify all milestones, activities, durations, dependencies, earliest and latest possible dates for accomplishing each milestone and activity, and the critical path for accomplishing the project. The Master Program Schedule is subject to City review and approval. **[CDRL 10-5]**
2. The MPS must be monitored and controlled by the Contractor's management team responsible for all management functions and be updated and submitted to the City at least monthly during the design and production phases of the Contract. To allow for program evaluation, the monthly updated schedule must display the program status and provide a comparison to the original schedule.

10.10 Truck History Books

1. The Contractor shall provide a Truck History Book for each overhauled truck. The Truck History Book template must be submitted for City review and approval. **CDRL 10-6]**
2. Truck History Books must be provided to the City at the delivery of each truck and contain all information required by this Specification, including:
   a. Serial Number of Truck.
   b. Certificate of Compliance, signed and dated, certifying that the assembled truck meets the requirements of this Specification.
   c. Manufacturer, model, revision level, and serial number of all serialized components installed and removed during the overhaul.
   d. Test and Inspection Records, including receiving inspection, pre-shipment inspection, and all other measurements or readings taken during overhaul.

e. Wheel, bearing and axle information, including all pertinent component ID numbers and measurements.
f. Work Checklists, demonstrating that all required work procedures have been completed.
g. Nonconforming Material Reports, including all attachments.
h. Corrective Action Plans for all work performed outside of the scope of this Specification.
i. Any City approved engineering changes, deviations and/or modifications incorporated into the particular truck that are not incorporated into all trucks, including as-built drawings.
j. Other documents as may be required by the City.

10.11 Facility Audit

1. All work under this Specification must be performed at the Contractor's or Subcontractor's facilities. Facilities used by the Contractor or Subcontractors may be subject to audit and approval by the City prior to conducting work under this contract.
2. The City may elect at any time to perform an audit of those aspects of the Contractor's or Subcontractor's facilities or operations that are related to work performed under this Contract. Reasonable notice will be provided by the City in advance of an audit.

10.12 In-Plant Representative

1. The City may station its own inspector at the Contractor's facilities during the Contract. The inspector shall be authorized to inspect all work in-process, work completed, and materials furnished for this Contract. The inspector may take measurements, determine quality of work performed, and make periodic assessments of the Contractor's and Subcontractors' work.
2. The Contractor shall provide at its facility one work station with lockable file storage.
3. The Contractor shall also provide access to telephones and highspeed internet access for City representative(s) to have direct access to the internet for connection to project websites and email, with sufficient capacity to exchange large project files, pictures, and drawings.
4. Upon request, the inspector shall have access to, and be provided with, copies of all drawings, diagrams, data, test procedures, quality records, reports and other information used in connection with the Contract. Any requested documents and information must be provided to the inspector immediately upon request. Delays associated with providing requested information are the responsibility of the Contractor.
5. The Contractor shall extend to the City and its representative(s) full cooperation and necessary facilities to permit the convenient inspection of all materials, work, and equipment supplied. There must be a suitable means and tools to inspect and test all parts and equipment at the Contractor's facility, including final mechanical and electrical tests of all truck systems. The City's representatives must be permitted an agreed upon period of time to conduct each inspection.

11 CONTRACT DELIVERABLES (CDRL)

CDRL	Subject
6-1	Final Assembly Inspection and Functional Test Procedure
7-1	Burn-In Test Procedure (including acceptance criteria)
8-1	Visual Inspection Procedure
8-2	Magnetic Particle Inspection Procedure
8-3	Dye Penetrant Inspection Procedure
8-4	Ultrasonic Inspection Procedure
8-5	Weld Repair Procedure of Cracks in Fabricated Structures
8-6	Weld Repair Procedure of Defects in Castings
8-7	Weld Repair Procedure of Mounting Surfaces
8-8	Weld Repair Procedure of Clearance Holes
8-9	Repair Procedure of Threaded Holes
8-10	Weld Repair Procedure of Threaded Holes
8-11	Weld Repair Procedure of Secondary Brackets
8-12	WPS, PQR, and Welding Consumable Specifications
8-13	Straightening Procedure
8-14	Local Heat Treatment Procedure
8-15	Furnace Heat Treatment Procedure
8-16	Corrosion Protection Plan
8-17	Grit Blasting Procedure
8-18	Cleaning and Stripping Plan
8-19	Ground Pad Inspection, Cleaning, and Repair Procedure
8-20	Hydraulic System Leak Test Procedure
8-21	Electrical Testing Procedure
8-22	Flame, Smoke, and Toxicity Analysis
9-1	Project Quality Assurance Plan (PQAP)
9-2	Material Procurement and Control Plan
9-3	Inspection and Test Plan
9-4	Inspection and Test Procedures
9-5	Assembly FAI Package

CDRL	Subject
9-6	Component FAI Packages
9-7	Template for Nonconforming Material Reports
9-8	Template for Corrective Action Plans
10-1	Program Management and Overhaul Plan
10-2	Drawings, Schematics, Illustrated Parts Catalogs, and Maintenance Manuals
10-3	Correspondence Management Plan
10-4	Monthly Progress Report Template
10-5	Master Program Schedule
10-6	Truck History Book Template

END OF DOCUMENT

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12-1	202312	202312	TRUCK ASSEMBLY, POWERED		REF	
-1	75098528	75098528	. NAME PLATE, IDENTIFICATION	Restore	1	
-9	1185275	1185275	. FRAME, POWERED TRUCK	Remove paint; Measure and compare to original drawings; NDT weld inspection; weld repair as necessary; Repaint	1	
-12	97233640	97233640	. . GUIDING ROD ASSEMBLY	Clean, inspect, paint; Replace bushings; Repair/replace as necessary;	2	
-22	97239351	97239351	. . HOLDER, TRACK BRAKE	Clean, inspect, paint; Repair as necessary	2	
-23	97239352	97239352	. . HOLDER, TRACK BRAKE	Clean, inspect, paint; Repair as necessary	2	42
-29	97247431	97247431	. . HEAD BEAM ASSEMBLY, FRONT	Clean, inspect, paint; Replace bushings; Repair/replace as necessary;	1	
-30	97247432	97247432	. . HEAD BEAM ASSEMBLY, REAR	Clean, inspect, paint; Replace bushings; Repair/replace as necessary;	1	
-32	97198512	97198512	. PLATE, TRUCK IDENTIFICATION	Restore	1	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-2	7719	7719	WIRING INSTL, POWERED TRUCK		REF	
-56	A3600902	RC12003600902	. SENSOR, SPEED, SINGLE, (SGP PN 1232391) (LNBUR PN 247Y216)	Replace	1	
-57	A3600901	RC12003600901	. SENSOR, SPEED, (SGP PN 1232954) (LNBUR PN 247Y196)	Replace	2	
-58	A3600903	RC12003600903	. SENSOR, SPEED, DUAL (SGP PN 1232962) (LNBUR PN 247Y197)	Replace	1	
-83	99101038	99101038	. CONNECTOR COMPLETE, MOTOR, X11, X12	Clean, inspect; Replace as necessary	2	42
			CABLE ASSEMBLY, COPPER ROPE, ALL	Replace	ALL	
			CLAMP PLATES/BRACKETS, ALL	Clean, inspect; Replace as necessary	ALL	
			ISOLATION PLATES/CLAMPS/HALF SHELLS, ALL	Replace	ALL	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-3	75091064	75091064	PIPING INSTL, POWERED TRUCK		REF	
			HOSE ASSEMBLIES, ALL	Replace	ALL	
			PIPING/FITTINGS/COUPLINGS, ALL	Clean, inspect; Replace as necessary	ALL	42
			BRACKETS, ALL	Clean, inspect; Replace as necessary	ALL	
			HARDWARE/CLAMPS/SEALING ELEMENTS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-4	75088628	75088628	CONTROL SYSTEM INSTL, HP SPRING, POWERED TRUCK		REF	
	75088628	75088628	CONTROL SYSTEM INSTL, HP SPRING, POWERED TRUCK	Replace	2	42
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-5	75081309	75081309	TRACK CLEARER INSTL		REF	
-1	97235986	97235986	. RAIL CLEARER, REAR	Clean, inspect, paint; Repair as necessary	2	
-3	97218493	97218493	. TRACK CLEARER, FRONT	Replace	1	
-5	97241780	97241780	. PLATE	Clean, inspect, paint; Repair as necessary	2	42
-6	97235984	97235984	. RAIL CLEARER, RH	Clean, inspect, paint; Repair as necessary	1	
-7	97235985	97235985	. RAIL CLEARER, LH	Clean, inspect, paint; Repair as necessary	1	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-6	75084810	75084810	LIFTING STOP INSTL		REF	
	75084810	75084810	LIFTING STOP INSTL	Overhaul	2	42
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-7	75080562	75080562	SECONDARY SUSPENSION UNITS		REF	
-5	70066626	70066626	. SPRING, LAYER	Replace	2	
-13	70065574	70065574	. BUFFER (EMERGENCY SPRING)	Replace *Return removed material to CATS	4	42
			HARDWARE/SHIMS/SPACERS/ADAPTERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-8	75080563	75080563	LATERAL SUSPENSION INSTL		REF	
-1	70065572	70065572	. BUFFER, LATERAL	Replace	2	
-11	97233786	97233786	. STOP, LATERAL, PAINTED	Replace	4	42
-12	70065875	70065875	. DAMPER, HORIZONTAL (SACHS PN 401300000066)	Replace	2	

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-9	75086494	75086494	WHEEL GUARD INSTALLATION		REF	
-1	97277178	97277178.	WHEEL GUARD COMPLETE, POWERED TRUCK	Clean, inspect, paint; Repair as necessary	4	
-7	97255171	97255171.	MUDFLAP, RUBBER W/CUTOUT	Replace	2	42
	97233323	97233323.	MUDFLAP, RUBBER (NO CUTOUT)	Replace	2	
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-10	75094342	75094342	BOLSTER INSTL		REF	
-4	97239939	97239939.	RING, WEAR	Replace	1	
-5	70069475	70069475.	SEAL, V-RING	Replace	1	
-6	97239295	97239295..	PLATE, SLIDING	Replace	4	
-7	97239150	97239150..	RING	Replace	1	42
-8	97242509	97242509..	BOLSTER	Remove paint; Measure and compare to original drawings; NDT weld inspection; weld repair as necessary; Repaint	1	
-9	97239244	97239244.	CENTER PIN	Clean, inspect, check dimensions; Repair/replace as necessary	1	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-11	100385	100385	PRIMARY SUSPENSION INSTL		REF	
-1	97233128	-USE OEM P/N-	BAR, AXLE PROTECTION	Clean, inspect, paint; Repair as necessary	4	
-3	97233132	97233132.	PLATE, LIMIT STOP, 3MM	Clean, inspect, paint; Repair as necessary	4	
-7	70065577	70065577.	SPRING, CHEVRON	Replace	8	
-10	97240311	97240311.	STOP	Clean, inspect, paint; Repair as necessary	8	42
-15	97242636	97242636.	COUNTERSTAY ASSEMBLY	Clean, inspect, paint; Repair as necessary	8	
-16	70076532	70076532.	AXLE SUSPENSION, ADDITIONAL	Replace	4	
-17	97233124	97233124.	PLATE, LIMIT STOP, 6MM	Clean, inspect, paint; Repair as necessary	4	
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-12	75081128	75081128	TRACTION MOTOR MOUNTINGS		REF	
-1	99100714	99100714.	SUPPORT BEARING	Replace	2	
			PLATES, ALL	Clean, inspect, paint; Repair as necessary	ALL	42
			HARDWARE/SHIMS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12-13	75085301	75085301	MOTOR WHEELSET COMPLETE	See 1201/1203/1204/1205/1206/1300	REF	
12-14	75074248	75074248	TRUCK ASSEMBLY, UNPOWERED		REF	
-1	75100139	75100139.	NAMEPLATE, IDENTIFICATION	Restore	1	
-4	70063380	70063380.	HOSE ASSEMBLY	Replace	4	
-10	97231833	97231833.	RAIL CLEARER	Clean, inspect, paint; Repair as necessary	2	
-11	97231834	97231834.	RAIL CLEARER	Clean, inspect, paint; Repair as necessary	2	
-20	97229083	97229083.	HOLDER, TRACK BRAKE	Clean, inspect, paint; Repair as necessary	2	
-21	97229084	97229084.	HOLDER, TRACK BRAKE	Clean, inspect, paint; Repair as necessary	2	
-25	A3602802	RC12003602802.	SPEED SENSOR, DUAL (LNBUR PN 247Y155)	Replace	2	21
-27	A3602801	RC12003602801.	SPEED SENSOR (LNBUR PN 247BG SINGLE 0142-X-00)	Replace	2	
-34	70076610	70076610.	SLIP RING (GROUNDING CONTACT)	See Tab 1205	0	
-35	70081032	70081032.	SLIP RING (NON-GROUNDING- CONTACT)	Replace	2	
-37	75074334	75074334.	FRAME ASSEMBLY, UNPOWERED TRUCK	Remove paint; Measure and compare to original drawings; NDT weld inspection; weld repair as necessary; Repaint	1	
			COUPLINGS/FITTINGS, ALL	Clean, inspect; Replace as necessary	ALL	
			HARDWARE/SHIMS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-15	75086493	75086493	WIRING INSTL, UNPOWERED (CENTER) TRUCK		REF	
-16	97253017	97253017.	SHEET, CONNECTION	Clean, inspect; Replace as necessary	2	
-22	70046534	70046534.	CONTACT, CRIMP	Clean, inspect; Replace as necessary	20	
-23	70059927	70059927.	INSERT, MALE	Clean, inspect; Replace as necessary	4	
-24	70061285	70061285.	CONNECTOR SHELL	Clean, inspect; Replace as necessary	4	
-26	97250271	97250271.	CONNECTION, CARBODY	Replace	4	
-27	97233523	97233523.	CABLE, GROUND	Replace	2	

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
-29	97254431	97254431	. CABLE 1, GROUND	Clean, inspect; Replace as necessary	1	21
-31	97230568	97230568	. CABLE, EARTHING	Clean, inspect; Replace as necessary	2	
			BRAIDED CABLE ASSEMBLIES, ALL	Replace	ALL	
			CONDUIT & COUPLINGS, ALL	Replace	ALL	
			CLAMP PLATES/BRACKETS, ALL	Clean, inspect; Replace as necessary	ALL	
			ISOLATION PLATES/CLAMPS/HALF SHELLS, ALL	Replace	ALL	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-16	75084161	75084161	CONTROL SYSTEM INSTL, HP SPRING, UNPOWERED TRUCK		REF	
	75084161	75084161	CONTROL SYSTEM INSTL, HP SPRING, UNPOWERED TRUCK	Replace	2	21
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-17	75082221	75082221	LIFTING STOP INSTL		REF	
	75082221	75082221	LIFTING STOP INSTL	Overhaul	2	21
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-18	75080559	75080559	SECONDARY SUSPENSION INSTL		REF	
-5	70066692	70066692	. BUFFER (EMERGENCY SPRING)	Replace *Return removed material to CATS	4	21
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-19	75080560	75080560	LATERAL SUSPENSION INSTL		REF	
-1	70065863	70065863	. DAMPER, HORIZONTAL	Replace	2	
-4	97233156	97233156	. BUFFER ASSEMBLY, LATERAL	Replace	4	21
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-20	75080558	75080558	TRACTION LINK INSTL		REF	
-1	97234057	97234057	. GUIDING ROD ASSEMBLY	Clean, inspect, paint; Replace bushings; Repair as necessary	2	21
-5	97240704	97240704	. BRACKET, GUIDING ROD	Clean, inspect, paint; Repair as necessary	2	
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-21	75087895	75087895	WHEEL GUARD INSTL		REF	
-1	97233729	97233729	. WHEEL GUARD	Clean, inspect, paint; Repair as necessary	2	
-2	97233756	97233756	. WHEEL GUARD	Clean, inspect, paint; Repair as necessary	2	21
-5	97233323	97233323	. MUDFLAP, RUBBER	Replace	4	
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-22	75094875	75094875	PRIMARY SUSPENSION INSTL		REF	
-1	97216771	97216771	. ROD, GUIDING	Clean, inspect, paint; Replace bushings; Repair as necessary	4	
-4	97236251	97236251	. PLATE, LIFTING	Clean, inspect, paint; Repair as necessary	4	21
-8	97238980	97238980	. STOP, LIFTING	Clean, inspect, paint; Repair as necessary	4	
-10	70065344	70065344	. SPRING, CONE, PRIMARY SUSPENSION	Replace	8	
			HARDWARE/SHIMS/SPACERS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12-23	1221559	1221559	PREASSEMBLY, MB		REF	
			ENCLOSURES/MOUNTING PLATES & RAILS, ALL	Clean, inspect; Replace as necessary	ALL	
			VENTING ELEMENTS, ALL	Clean, inspect; Replace as necessary	ALL	
			CLAMPING SADDLES, ALL	Clean, inspect; Replace as necessary	ALL	
			CONNECTOR ASSEMBLIES/FITTINGS, ALL	Replace	ALL	42
			CABLE GLANDS/SEALING ELEMENTS, ALL	Replace	ALL	
			MOTOR & GROUNDING CABLES, ALL	Clean, inspect; Replace as necessary	ALL	
			HARDWARE, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.1-1	225501	225501	DRIVING WHEELSET (BVV PN 1RW9129.101)	See below	2	
-2	225483	225483	. AXLE, DRIVING WHEELSET (BVV PN 1RW9129.201)	Clean and inspect; Measure and compare to original drawings; NDT; Replace as necessary	2	42
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12.1-2	225521	225521	DRIVING WHEEL (BVV PN 2RW9129.401)	See below	4	
-1	2RW9129.411	2RW9129.411	. WHEEL CENTER	Clean and inspect; Replace as necessary	4	
-2	3RW9129.421	3RW9129.421	. WHEEL TIRE	Replace	4	
-3	2RW8655.441	2RW8655.441	. RING, DETACHABLE	Clean and inspect; Replace as necessary	4	42
-5	M100.00.01.84	M100.00.01.84	. BLOCK, RUBBER	Replace	ALL	
-6	EK4527-2/1	EK4527-2/1	. SHUNT, COPPER	Replace	ALL	
			HARDWARE & SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.2-1	1235689	1235689	LOW FLOOR AXLE AND WHEELSET (SKF PN ABP-7006)	See below	2	
-1	VC-ABP-7002	VC-ABP-7002	. AXLE, LOW FLOOR (INCLUDES ITEM 2)	Clean and inspect; Measure and compare to original drawings; NDT	2	
-3	HE-ABP-7002-01	-USE OEM P/N-	. COVER	Clean, inspect, paint; Replace as necessary	4	
-4	SL-ABP-7002	SL-ABP-7002	. RING, BACKING	Clean, inspect; Replace as necessary	4	
-5	HE-ABP-7002-02	-USE OEM P/N-	. WHEEL, IMPULSE	Clean, inspect; Replace as necessary	4	
-11	BT2-2010A	BT2-2010A	. BEARING ASSEMBLY, TAPERED	Replace	4	
-13	HE-ABP-7002-03	-USE OEM P/N-	. COVER	Clean, inspect, paint; Replace as necessary	4	
-22	436586-101	-USE OEM P/N-	. HUB FLANGE (W/ INTERFACE FOR GROUNDING DEVICE [WAS HUB FLANGE, RH P/N RV-ABP-7002-01]	Clean, inspect, paint; Repair as necessary	2	21
	436586-102	-USE OEM P/N-	. HUB FLANGE (WITHOUT INTERFACE FOR GROUNDING DEVICE [WAS HUB FLANGE, LH P/H RV-ABP-7002-02]	Clean, inspect, paint; Repair as necessary	2	
	436678		. HUB FLANGE SPACER RING	Clean, inspect, paint; Repair as necessary	4	
			. HUB FLANGE O-RING 120x2	Replace	4	
-24	XX-ABP-7002-02	-USE OEM P/N-	. SUPPORT, CONNECTING ROD, LEFT	Clean, inspect, paint; Repair as necessary	2	
	XX-ABP-7002-01	-USE OEM P/N-	. SUPPORT, CONNECTING ROD, RIGHT	Clean, inspect, paint; Repair as necessary	2	
-27	WV-ABP-7002	WV-ABP-7002	. END CAP	Clean, inspect, paint; Repair as necessary	4	
			HARDWARE/SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12.2-2	1235687	1235687	LOW FLOOR WHEEL WITH SHUNTS (BVV PN 2RW9129.402)	See below	2	
-1	1RW8655.412	1RW8655.412	. WHEEL CENTER	Clean and inspect; Replace as necessary	2	
-2	3RW9129.421	3RW9129.421	. WHEEL TIRE	Replace	2	
-3	2RW8655.441	2RW8655.441	. RING, DETACHABLE	Clean and inspect; Replace as necessary	2	21
-5	M100.00.01.84	M100.00.01.84	. BLOCK, RUBBER	Replace	ALL	
-6	EK4527-2/1	EK4527-2/1	. SHUNT, COPPER	Replace	ALL	
			HARDWARE/SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21
12.2-3	1235688	1235688	LOW FLOOR WHEEL W/O SHUNTS (BVV PN 2RW9129.403)	See below	2	
-1	1RW8655.412	1RW8655.412	. WHEEL CENTER	Clean and inspect; Replace as necessary	2	
-2	3RW9129.421	3RW9129.421	. WHEEL TIRE	Replace	2	
-3	2RW8655.441	2RW8655.441	. RING, DETACHABLE	Clean and inspect; Replace as necessary	2	21
-5	M100.00.01.84	M100.00.01.84	. BLOCK, RUBBER	Replace	ALL	
			HARDWARE/SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.3-1	A5E00141220A/1.00	-USE OEM P/N-	MOTOR, COMPLETE, A5E00141220E01	OEM Overhaul per 5.5 of HRM 1203, see details below	2	
-1	A5E00141220A/1.10	-USE OEM P/N-	. STATOR, COMPLETE, A5E00150802E01	Clean, inspect, repaint, and test per Section 5.5.2 of HRM 1203; Replace Ductile Iron Bearing	2	
-20	A5E00141220A/2.00	-USE OEM P/N-	. ROTOR, COMPLETE, A5E00141218E01	Check shaft, core assembly and cage winding for mechanical damage per Section 5.5.3 of HRM 1203; Re-balance	2	
-27	A5E00141220A/ 5.0	-USE OEM P/N-	. CARTRIDGE, BEARING (N-END) A5E00150995E01	Clean, inspect, repaint; Repair/replace as necessary per Section 5.5.5 of HRM 1203; Replace cylindrical roller bearings	2	
-35	A5E00141220A/ 6.00	-USE OEM P/N-	. SHIELD, BEARING (N-END) A5E00150992E01	Clean, inspect, repair, and repaint per HRM 1203	2	
-47	A5E00141220A/ 7.20	-USE OEM P/N-	. COVER, TERMINAL BOX, A5E00166390E01	Clean, inspect, repaint; Repair as necessary	2	
-50	A5E00141220A/ 7.30	-USE OEM P/N-	. INSULATOR, MV52B/E01	Test and replace as necessary per HRM 1203 5.5.4	6	
-52	A5E00141220A/ 8.10.1	-USE OEM P/N-	. LEAD, CONNECTING, “U”	Test and replace as necessary per HRM 1203 5.3.2	2	42
	A5E00141220A/ 8.10.2	-USE OEM P/N-	. LEAD, CONNECTING, “V”	Test and replace as necessary per HRM 1203 5.3.2	2	
	A5E00141220A/ 8.10.3	-USE OEM P/N-	. LEAD, CONNECTING, “W”	Test and replace as necessary per HRM 1203 5.3.2	2	
-62	A5E00141220A/ 9.10	-USE OEM P/N-	. MINICODER (TACHOMETER) 247-V1S-M2000S-6M	Replace	2	
-64	A5E00141220A/ 10.10	-USE OEM P/N-	. PLATE, A5E00182938E01	Clean, inspect, renew	2	
-66	A5E00141220A/ 10.30	-USE OEM P/N-	. LABEL, “GROUND”, DIN40011-1A25-16-ST	Renew	2	
-69	A5E00141220A/ 11.10	-USE OEM P/N-	. COUPLING HALF ON MOTOR SIDE	Clean and Inspect; Replace as necessary	2	
-70	A5E00141220A/ 11.11	-USE OEM P/N-	. WEIGHT, BALANCING, SN 66600-21- MS/E01	Re-balance during re-build	ALL	
-71	A5E00141220A/ 11.20	-USE OEM P/N-	. COUPLING HALF, GEAR UNIT SIDE	See 1204 item -39	2	
-86	A5E00141220A/ 13.20	-USE OEM P/N-	. COVER, HINGED GEAR ASSEMBLY	Clean, inspect, repaint; Repair as necessary	2	
			HARDWARE/SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.4-1	139.00104510	139.0010451	AXLE GEAR UNIT ASSEMBLY, SZH 420	OEM overhaul including replacement of all bearings and seals per Section 8.2 of RMS 1204 and HRM 1204, See details below	2	
-1	139.00104610	139.0010461	. HOUSING ASSEMBLY, (ITEMS 2-22)	See below	2	
-2	132.00061810	132.0006181	. HOUSING	Clean, inspect, paint; Repair as necessary	2	
-3	132.00135610	132.0013561	. DIPSTICK, MAGNETIC	Replace	2	
-8	H90.161110	H90.161110	. BREATHER, FILTER	Replace	2	
-9	H32.182210	H32.182210	. GLASS, OIL LEVEL	Replace	2	
-12	132.00234510	132.0023451	. COVER, TOP	Clean, inspect, paint; Repair as necessary	2	
-16	132.00063510	132.0006351	. COVER, BOTTOM	Clean, inspect, paint; Repair as necessary	2	
-23	139.00026910	139.0002691	. AXLE DRIVE (ITEMS 24-39)	See below	2	
-24	132.00063610	132.0006361	. SHAFT, PINION	Clean, inspect; Replace as necessary	2	
-25	190.00017810	190.0001781	. BEARING, ROLLER, CYLINDRICAL	Replace	2	
-26	H20.511910	H20.511910	. PIN, RETAINING	Clean, inspect; Replace as necessary	4	
-27	H01.020464	H01.020464	. BEARING, BALL	Replace	2	
-28	132.00116710	132.0011671	. RING, SPACER, 87 X 75 X 5	Clean, inspect; Replace as necessary	2	
-29	132.00116910	132.0011691	. RING, SPACER, 125 X 115 X 5	Clean, inspect; Replace as necessary	2	
-30	H01.062990	H01.062990	. BEARING, ROLLER, CYLINDRICAL	Replace	2	
-31	132.00064110	132.0006411	. GASKET	Replace	2	
-32	H01.001843	H01.001843	. PIN, STRAIGHT, SPRING TYPE	Clean, inspect; Replace as necessary	2	
-33	132.00064210	132.0006421	. RING, LABYRINTH, 119/75 X 47.5	Clean, inspect; Replace as necessary	2	
-34	132.00064310	132.0006431	. COVER, LABYRINTH	Clean, inspect; Replace as necessary	2	
-38	132.00064410	132.0006441	. RING, ADJUSTING, 195/145 X 3.5	Replace	2	
-39	190.00021310	190.0002131	. COUPLING, GEAR UNIT HALF	Clean, inspect; Replace as necessary	2	
-40	139.00027010	139.0002701	. INTERMEDIATE SHAFT ASSEMBLY (ITEMS 41-52)	See below	2	
-41	132.00064612	132.00064612	. SHAFT, INTERMEDIATE	Clean, inspect; Replace as necessary	2	
-42	132.00064710	132.0006471	. GEAR, SPUR	Clean, inspect; Replace as necessary	2	
-43	132.00064810	132.0006481	. PINION	Clean, inspect; Replace as necessary	2	
-44	132.00064910	132.0006491	. COVER	Clean, inspect, paint; Repair as necessary	2	
-47	132.00065010	132.0006501	. RING, ADJUSTING, 211 X 162 X 3.3	Replace	2	
-48	H01.093187	H01.093187	. BEARING, ROLLER	Replace	2	
-49	190.00017910	190.0001791	. BEARING, ROLLER, CYLINDRICAL	Replace	2	
-53	139.00104710	139.0010471	. OUTPUT DRIVE ASSEMBLY (ITEMS 54-72)	See below	2	42
-54	132.00065310	132.0006531	. GEAR, SPUR	Clean, inspect; Replace as necessary	2	
-55	00235610	235610	. SHAFT, HOLLOW	Clean, inspect; Replace as necessary	2	
-56	132.00208310	132.0020831	. COVER, LABYRINTH	Clean, inspect; Replace as necessary	2	
-60	132.00065510	132.0006551	. RING, LABYRINTH	Clean, inspect; Replace as necessary	2	
-61	132.00065410	132.0006541	. GASKET	Replace	2	
-62	H01.151400	H01.151400	. PIN, STRAIGHT, 2.5, M6 X 6	Clean, inspect; Replace as necessary	2	
-63	190.00017010	190.0001701	. BEARING, ROLLER, TAPERED	Replace	2	
-64	190.00017110	190.0001711	. BEARING, ROLLER, TAPERED	Replace	2	
-66	132.00066110	132.0006611	. RING, ADJUSTING, 236/215.5 X 3.5	Replace	2	
-67	H01.098165	H01.098165	. CIRCLIP, 215 X 5	Replace	2	
-68	132.00065910	132.0006591	. RING, LABYRINTH, 263/215.2 X 46	Clean, inspect; Replace as necessary	2	
-69	132.00066012	132.00066012	. COVER, LABYRINTH	Clean, inspect, paint; Repair as necessary	2	
-73	132.00213910	132.0021391	. RING, 260/215.2 X 10	Clean, inspect; Replace as necessary	2	
-74	132.00214010	132.0021401	. RING, 260/226 X 10	Clean, inspect; Replace as necessary	2	
-75	139.00027210	139.0002721	. SUSPENSION ASSEMBLY (ITEMS 76-80)	See below	2	
-76	H91.349710	H91.349710	. SUPPORT	Replace	2	
-77	H32.217610	H32.217610	. SLEEVE, SPACER, 59/26 X 105	Clean, inspect; Replace as necessary	2	
-78	190.00023810	190.0002381	. BEARING, SPHERICAL	Replace	2	
-79	190.00025710	190.0002571	. BEARING, SPHERICAL	Replace	2	
-80	H01.019594	H01.019594	. CIRCLIP, 80 X 2.5	Replace	4	
-81	H01.053416	H01.053416	. PLATE, NAME AND RATING	Clean, inspect, renew	2	
-83	H32.510710	H32.510710	. PLATE, INSTRUCTION	Clean, inspect, renew	2	
-84	139.00027410	139.0002741	. COUPLING, KEY PACKET (ITEMS 85-92)	See below	2	
-85	190.00021210	190.0002121	. PAD, RUBBER	Replace	24	
-86	132.00078110	132.0007811	. DRUM, CARDAN	Clean, inspect, paint; Repair as necessary	2	

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
-89	132.00078210	132.0007821	. SPIDER, AXLE	Clean, inspect, paint; Repair as necessary	2	
-93	190.00021410	190.0002141	. COUPLING, MOTOR HALF	See 1203 item -69	2	
			BEARINGS, ALL	Replace	ALL	
			HARDWARE/SEALS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.5-1	06.21.0097.10	06.21.0097.10	GROUNDING DEVICE ASSEMBLY (PT)	See below	2	
-4	06.50.0131.10	06.50.0131.10	. CONTACT ASSEMBLY (INCLUDES ITEMS 21-27)	See below	2	
-11	51.49.0970.00	51.49.0970.00	. RING, HOUSING	Clean, inspect; Replace as necessary	2	
-12	00.08.004	00.08.004	. STRIP, FELT	Replace	2	
-13	16.19.0101.03	16.19.0101.03	. DISC, CONTACT	Replace	2	
-16	51.49.0971.02	51.49.0971.02	. CARRIER, CONTACT DISC	Clean, inspect; Replace as necessary	2	
-18	51.49.1031.00	51.49.1031.00	. ADAPTER	Clean, inspect; Replace as necessary	2	42
-21	51.49.0960.06	51.49.0960.06	. HOUSING, FINISHED	Clean, inspect; Replace as necessary	2	
-22	16.19.0102.03	16.19.0102.03	. BRUSH, CARBON (6 SEGMENTS)	Replace	2	
-24	51.64.0062.00	51.64.0062.00	. PAD, DAMPING	Replace	6	
-26	51.66.0384.00	51.66.0384.00	. DISC, PRESSURE	Clean, inspect; Replace as necessary	2	
-27	50.00.9100.00	50.00.9100.00	. SPRING	Replace	2	
			HARDWARE/SEALS/SHIMS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
12.5-2	06.21.0111.00	06.21.0111.00	GROUNDING CONTACT INSTL (CT)	See below	2	
-4	51.48.0394.00	51.48.0394.00	. CONTACT	Replace	2	
-5	51.49.1033.00	51.49.1033.00	. BRIDGE, CONTACT	Replace	2	
-9	06.50.0145.00	06.50.0145.00	. BRUSH	Replace	10	
-12	51.49.1032.01	51.49.1032.01	. HOUSING	Clean, inspect; Replace as necessary	2	21
-20	42.00.216	42.00.216	. LAMINAR SEALING	Replace	4	
-21	06.50.0146.00	06.50.0146.00	. DISC, CONTACT	Replace	2	
			HARDWARE/SEALS/SHIMS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
12.6-1	70079674	70079674	PT JOURNAL BEARING (TIMKN PN K160162-9011)	See below	2	
	70076547	70076547	PT JOURNAL BEARING, NON-GROUNDING (TIMKN PN K160162-90010)	See below	2	
-1	A3375700	A3375700	. HOUSING, CAST AL, (TIMKEN PN K160162)	Clean, inspect, paint; Replace as necessary	4	
-2	A3375600	A3375600	. CONE ASSEMBLY, CASE CARBURIZED STEEL, (TIMKEN PN HM120846)	Replace	8	
-3	HM120817XD	HM120817XD	. CUP, DOUBLE, CASE CARBURIZED STEEL	Replace	4	
-4	HM120846XA	HM120846XA	. SPACER, CONE, ST	Replace	4	
-5	K135469	K135469	. ENCLOSURE, ST	Replace	4	
	K512096	K512096	. . GROMMET	Replace	4	
-6	K127951	K127951	. FLINGER, ST	Replace	4	42
-7	K160164	K160164	. RING, BACKING, ST	Clean, inspect; Replace as necessary	4	
-8	K133218	K133218	. SEAL, V RING, NITRILE RUBBER	Replace	4	
-9	K160163	K160163	. COVER, INSIDE, CAST IRON	Clean, inspect, paint; Repair as necessary	4	
-12	K160165	K160165	. END CAP, AXLE, ST	Clean, inspect, paint; Repair as necessary	4	
-15	K159937	K159937	. COVER, OUTSIDE, CAST AL	Clean, inspect, paint; Repair as necessary	4	
			HARDWARE/SEALS/SHIMS, ALL	Replace	ALL	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
13-1	KB10211/2A	KB10211/2A	FRICTION BRAKE SYSTEM	See below	REF	
-1	STN31984	STN31984	. ESRA (SEE FIGURE 13-2)	Out of Scope	1	42
-2	A2166700	RC02002166700	. CURRENT REGULATOR VE-1232 (KNORR PN 807048) (SEE FIGURE 13-3)	Out of Scope	2	63
-3	II/55150/E	II/55150/E	. EHU 70PNLF/01 PT (SEE FIGURE 13-4, 13-5, 13-6, 13-7)	Replace all valves, transducers, and sight glasses plus OEM overhaul per overhaul kit	1	42
-4	II/55151/E	II/55151/E	. EHU 70ANLF/01 CT (SEE FIGURE 13-8, 13-9, 13-10, 13-6, 13-7)	Replace all valves, transducers, and sight glasses plus OEM overhaul per overhaul kit	1	21
-5	A7815400	RC02007815400	. ACCUMULATOR 3.5 LITER (KNORR PN II/48767/01S) (SEE FIGURE 13-11)	Replace	2	63
-6	II/48778/01S	II/48778/01S	. ACCUMULATOR 2.0 LITER /SEE FIGURE 13-12 FOR BREAKDOWN/	Replace	2	42
-9	II/46474/U11Y	II/46474/U11Y	. BRAKE CALIPER PT HC1P28N (SEE FIGURE 13-15, 13-16, 13-17)	OEM overhaul per overhaul kit	2	42
-10	II/46474/U21Y	II/46474/U21Y	. BRAKE CALIPER PT HC1P28N (SEE FIGURE 13-18, 13-16, 13-17)	OEM overhaul per overhaul kit	2	42
-11	C55102/20C7	C55102/20C7	. BRAKE PAD 120 CM	Replace	8	21
-12	C78597/17C7	C78597/17C7	. BRAKE PAD LEFT HAND SIDE	Replace	4	42
-13	II/48491/U21Y	II/48491/U21Y	. BRAKE CALIPER CT RH HF2A15 (SEE FIGURE 13-19)	OEM overhaul per overhaul kit	2	21
-14	II/43211/1/U	II/43211/1/U	. BRAKE DISC PT W/HUB (SEE FIGURE 13-20)	Replace	2	42
-15	II/43214/1/U	II/43214/1/U	. BRAKE DISC PT / SPLIT (SEE FIGURE 13-21)	Replace	2	42
-16	II/19631/2C/U	II/19631/2C/U	. BRAKE DISC CT (SEE FIGURE 13-22)	Replace	4	21
-17	C78598/17C7	C78598/17C7	. BRAKE PAD RIGHT HAND SIDE	Replace	4	42
-18	807040	807040	. PRESSURE SWITCH SPDT 72 PSI	Replace	2	42
-20	STU14387/D	STU14387/D	. HAND PUMP ASSEMBLY (SEE FIGURE 13-23)	Replace	1	21
-21	807368	807368	. SELECTOR VALVE W/TUBE FITTING (SEE FIGURE 13-24)	Inspect; replace as necessary	1	42
-22	A2200000	RC02002200000	. SELECTOR VALVE ASSEMBLY (KNORR PN 801722/1) (SEE FIGURE 13-25)	OEM overhaul per overhaul kit	1	21
-23	II/30147	II/30147	. OIL RESERVOIR (SEE FIGURE 13-26)	Replace	1	42
-24	II/48011/UY	II/48011/UY	. SUSPENSION LEG PT (SEE FIGURE 13-27)	OEM overhaul per overhaul kit	2	42
-25	II/48010/UY	II/48010/UY	. SUSPENSION LEG CT /SEE FIGURE 13-28)	OEM overhaul per overhaul kit	4	21
-26	807050	807050	. LEVEL SENSOR B (SEE FIGURE 13-29)	Replace	2	63
-27	II/48491/U11Y	II/48491/U11Y	. BRAKE CALIPER CT LH HF2A15 (SEE FIGURE 13-30)	OEM overhaul per overhaul kit	2	21
-28	II/48778/02S	II/48778/02S	. ACCUMULATOR 2.0 LITER (SEE FIGURE 13-31)	Replace	4	21
-29	STN31984/1	STN31984/1	. ESRA CT (SEE FIGURE 13-32)	Out of Scope	1	21
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	63
-20	STU14387/D	STU14387/D	. HAND PUMP ASSEMBLY (SEE FIGURE 13-23)	Option = Overhaul per OEM	1	21

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Units/ Truck	Trucks
13.1-2	II/48049/US	II/48049/US	TRACK BRAKE, POWERED TRUCK /SEE FIGURE 13.1-1-1 FOR NHA/	Overhaul per HRM 1301 Section 3 & IPC Overhaul kit; Replace wear plates & associated hardware	2	
-1	II48702/US	II48702/US	. MAGNET	See below	2	
-2	II48701	I/48701	. . MAGNET BODY	See below	2	
-3	II48700	II48700	. . . MAGNET BODY	Megger test coil per HRM 1301 Section 3.3.3; Replace as necessary	2	
-4	393131	393131	. . . NAME PLATE	Clean, renew	2	
-6	II48827	II48827	. . TIE BAR	See below	4	
-7	II48828	II48828	. . . TIE BAR	Clean, inspect; Repair as necessary	2	
-8	393021	393021	. . . FLANGED BUSH	Replace	2	
-9	C101851	C101851	. . . WEARING PLATE, 65 X 35 X 9	Replace	4	
-10	393102	393102	. . . RIVET, B5 X 12-CU, DIN7338	Replace	8	
-11	II48825/B	II48825/B	. . CABLE TERMINAL	Clean, inspect;	4	
-17	390795	390795	. . RAIL SHOE, 25 X 40 X 940	Replace	4	
-18	391270	391270	. . STRIP, 38 X 7 X 940	Replace	2	
-19	394198	394198	. . RING PIN, 13	Replace	8	42
-20	394191	394191	. . RING NUT, M12/SW12	Replace	8	
-21	468370	468370	. . COUNTERSUNK SCREW, M12 X 110-8.8, DIN7991, ZN8MTCC	Replace	8	
-22	468397	468397	. . MACHINE SCREW M12 X 25-8.8, DIN912, N12005-P01	Replace	10	
-23	468576	468576	. . MACHINE SCREW M12 X 40-8.8, DIN912, N12005-P01	Replace	10	
-26	468389	468389	. . LOCK WASHER, S12, N12005-013	Replace	20	
-27	393068	393068	. . STOPPER	Replace	8	
-28	393017	393017	. . STOPPER	Replace	8	
-29	393007	393007	. . STOPPER	Replace	20	
-32	II/48840/R	II/48840/R	. COMPRESSION SPRING SUSPENSION	Test compression spring per HRM 1301 Section 3.4; Replace springs as necessary; Replace all overhaul kit items	4	
-44*	II/48492/US/OH	-USE OEM P/N-	OVERHAUL KIT (INCLUDES ITEMS 17, 18, 22, 23, 26, 29, 38, 41, 42, AND 43)	Overhaul all items in overhaul kit	2	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	42
13.1-3	II/48492/US	II/48492/US	TRACK BAKE, CENTER TRUCK /SEE FIGURE 13.1-1-2 FOR NHA/	Overhaul per HRM 1301 Section 3 & IPC Overhaul kit; Replace wear plates & associated hardware	2	
-1	II48734/US	II48734/US	. MAGNET	See below	2	
-2	II48701	II48701	. . MAGNET BODY	See below	2	
-3	II48700	II48700	. . . MAGNET BODY	Megger test coil per HRM 1301 Section 3.3.3; Replace as necessary	2	
-4	393131	393131	. . . NAME PLATE	Clean, renew	2	
-6	II62155	II62155	. . TIE BAR	See below	4	
-7	II62157	II62157	. . . TIE BAR	Clean, inspect; Repair as necessary	2	
-8	393021	393021	. . . FLANGED BUSH	Replace	2	
-9	C124249	C124249	. . . WEARING PLATE, 120 X 40 X 6	Replace	4	
-10	468896	468896	. . . SCREW, COUNTERSUNK	Replace	8	
-11	II48825/A	II48825/A	. . CABLE TERMINAL	Clean, inspect;	4	
-17	390795	390795	. . RAIL SHOE, 25 X 40 X 940	Replace	4	
-18	391270	391270	. . STRIP, 38 X 7 X 940	Replace	2	
-19	394198	394198	. . RING PIN, 13	Replace	8	21
-20	394191	394191	. . RING NUT, M12/SW12	Replace	8	
-21	468370	468370	. . COUNTERSUNK SCREW, M12 X 110-8.8, DIN7991	Replace	8	
-22	468397	468397	. . MACHINE SCREW M12 X 25-8.8, DIN912, N12005-P01	Replace	10	
-23	468576	468576	. . MACHINE SCREW M12 X 40-8.8, DIN912, N12005-P01	Replace	10	
-26	468389	468389	. . LOCK WASHER, S12, N12005-P13	Replace	20	
-27	393068	393068	. . STOPPER	Replace	8	
-28	393017	393017	. . STOPPER	Replace	8	
-29	393007	393007	. . STOPPER	Replace	20	
-32	II48840/R	II48840/R	. SPRING SUSPENSION ASSEMBLY	Test compression spring per HRM 1301 Section 3.4; Replace springs as necessary; Replace all overhaul kit items	4	
-44*	II/48492/US/OH	-USE OEM P/N-	OVERHAUL KIT (INCLUDES ITEMS 17, 18, 22, 23, 26, 29, 38, 41, 42, AND 43)	Overhaul all items in overhaul kit	2	
			HIDDEN DAMAGE ESTIMATE	Estimate for out of scope work	AR	21

IPC FIG. & INDEX #	P/N	CATS P/N	Description	OH Action	Spare Inventory
12-1	202312	202312	TRUCK ASSEMBLY, POWERED		REF
-12	97233640	97233640	. . GUIDING ROD ASSEMBLY	Clean, inspect, paint; Replace bushings; Repair/replace as necessary;	12
12-2	7719	7719	WIRING INSTL, POWERED TRUCK		REF
-56	A3600902	RC12003600902	. SENSOR, SPEED, SINGLE, (SGP PN 1232391) (LNBUR PN 247Y216)	Replace	24
-57	A3600901	RC12003600901	. SENSOR, SPEED, (SGP PN 1232954) (LNBUR PN 247Y196)	Replace	47
-58	A3600903	RC12003600903	. SENSOR, SPEED, DUAL (SGP PN 1232962) (LNBUR PN 247Y197)	Replace	19
12-7	75080562	75080562	SECONDARY SUSPENSION UNITS		REF
-13	70065574	70065574	. BUFFER (EMERGENCY SPRING)	Replace *Return removed material to CATS	7
12-8	75080563	75080563	LATERAL SUSPENSION INSTL		REF
-12	70065875	70065875	. DAMPER, HORIZONTAL (SACHS PN 401300000066)	Replace	11
12-11	100385	100385	PRIMARY SUSPENSION INSTL		REF
-7	70065577	70065577	. SPRING, CHEVRON	Replace	171
12-13	75085301	75085301	MOTOR WHEELSET COMPLETE	See 1201/1203/1204/1205/1206/1300	2
12.1-1-2	225501	225501	AXLE, DRIVING WHEELSET (BVV PN 1RW9129.201)	See 1201	2
12.1-2	225521	225521	DRIVING WHEEL (BVV PN 2RW9129.401)	See 1201	4
12.3-1	A5E00141220A/1.00	-USE OEM P/N-	MOTOR, COMPLETE, A5E00141220E01	See 1203	2
12.4-1	139.00104510	139.0010451	AXLE GEAR UNIT ASSEMBLY, SZH 420	See 1204	2
12.5-1	06.21.0097.10	06.21.0097.10	GROUNDING DEVICE ASSEMBLY (PT)	See 1205	2
12.6-1	70079674	70079674	PT JOURNAL BEARING (TIMKN PN K160162-9011)	See 1206	2
12.6-1	70076547	70076547	PT JOURNAL BEARING, NON-GROUNDING (TIMKN PN K160162-90010)	See 1206	2
13-1	KB10211/2A	KB10211/2A	FRICTION BRAKE SYSTEM	See below	REF
-14	II/43211/1/U	II/43211/1/U	. BRAKE DISC PT W/HUB (SEE FIGURE 13-20)	Replace	2
-15	II/43214/1/U	II/43214/1/U	. BRAKE DISC PT / SPLIT (SEE FIGURE 13-21)	Replace	2
12-14	75074248	75074248	TRUCK ASSEMBLY, UNPOWERED		REF
-25	A3602802	RC12003602802	. . SPEED SENSOR, DUAL (LNBUR PN 247Y155)	Replace	23
-27	A3602801	RC12003602801	. . SPEED SENSOR (LNBUR PN 247BG SINGLE 0142-X-00)	Replace	25
12-18	75080559	75080559	SECONDARY SUSPENSION INSTL		REF
-5	70066692	70066692	. BUFFER (EMERGENCY SPRING)	Replace *Return removed material to CATS	0
12-19	75080560	75080560	LATERAL SUSPENSION INSTL		REF
-1	70065863	70065863	. DAMPER, HORIZONTAL	Replace	1
12-20	75080558	75080558	TRACTION LINK INSTL		REF
-1	97234057	97234057	. GUIDING ROD ASSEMBLY	Clean, inspect, paint; Replace bushings; Repair as necessary	6
12-22	75094875	75094875	PRIMARY SUSPENSION INSTL		REF
-10	70065344	70065344	. SPRING, CONE, PRIMARY SUSPENSION	Replace	0
12.2-1	1235689	1235689	LOW FLOOR AXLE AND WHEELSET (SKF PN ABP-7006)	See 1202	2
12.4-1	139.00104510	139.0010451	AXLE GEAR UNIT ASSEMBLY, SZH 420	See 1204	1
12.5-1	06.21.0097.10	06.21.0097.10	GROUNDING DEVICE ASSEMBLY (PT)	See 1205	
12.5-2	06.21.0111.00	06.21.0111.00	GROUNDING CONTACT INSTL (CT)	See 1205	
12.6-1	70079674	70079674	PT JOURNAL BEARING (TIMKN PN K160162-9011)	See 1206	0
	70076547	70076547	PT JOURNAL BEARING, NON-GROUNDING (TIMKN PN K160162-90010)	See 1206	2
13-1	KB10211/2A	KB10211/2A	FRICTION BRAKE SYSTEM	See below	REF
-3	II/55150/E	II/55150/E	. EHU 70PNLF/01 PT (SEE FIGURE 13-4, 13-5, 13-6, 13-7)	Replace all valves, transducers, and sight glasses plus OEM overhaul per overhaul kit	11
-4	II/55151/E	II/55151/E	. EHU 70ANLF/01 CT (SEE FIGURE 13-8, 13-9, 13-10, 13-6, 13-7)	Replace all valves, transducers, and sight glasses plus OEM overhaul per overhaul kit	6
-5	A7815400	RC02007815400	. ACCUMULATOR 3.5 LITER (KNORR PN II/48767/01S) (SEE FIGURE 13-11)	Replace	29
-6	II/48778/01S	II/48778/01S	. ACCUMULATOR 2.0 LITER /SEE FIGURE 13-12 FOR BREAKDOWN/	Replace	18
-9	II/46474/U11Y	II/46474/U11Y	. BRAKE CALIPER PT HC1P28N (SEE FIGURE 13-15, 13-16, 13-17)	OEM overhaul per overhaul kit	17
-10	II/46474/U21Y	II/46474/U21Y	. BRAKE CALIPER PT HC1P28N (SEE FIGURE 13-18, 13-16, 13-17)	OEM overhaul per overhaul kit	7
-13	II/48491/U21Y	II/48491/U21Y	. BRAKE CALIPER CT RH HF2A15 (SEE FIGURE 13-19)	OEM overhaul per overhaul kit	14
-18	807040	807040	. PRESSURE SWITCH SPDT 72 PSI	Replace	8
-20	STU14387/D	STU14387/D	. HAND PUMP ASSEMBLY (SEE FIGURE 13-23)	Replace	5
-21	807368	807368	. SELECTOR VALVE W/TUBE FITTING (SEE FIGURE 13-24)	Inspect; replace as necessary	2

-22	A2200000	RC02002200000	. SELECTOR VALVE ASSEMBLY (KNORR PN 801722/1) (SEE FIGURE 13-25)	OEM overhaul per overhaul kit	0
-23	II/30147	II/30147	. OIL RESERVOIR (SEE FIGURE 13-26)	Replace	16
-24	II/48011/UY	II/48011/UY	. SUSPENSION LEG PT (SEE FIGURE 13-27)	OEM overhaul per overhaul kit	32
-25	II/48010/UY	II/48010/UY	. SUSPENSION LEG CT /SEE FIGURE 13-28)	OEM overhaul per overhaul kit	24
-26	807050	807050	. LEVEL SENSOR B (SEE FIGURE 13-29)	Replace	11
-27	II/48491/U11Y	II/48491/U11Y	. BRAKE CALIPER CT LH HF2A15 (SEE FIGURE 13-30)	OEM overhaul per overhaul kit	12
-28	II/48778/02S	II/48778/02S	. ACCUMULATOR 2.0 LITER (SEE FIGURE 13-31)	Replace	0
13.1-2	II/48049/US	II/48049/US	TRACK BRAKE, POWERED TRUCK	Overhaul per HRM 1301 Section 3 & IPC Overhaul kit; Replace wear plates & associated hardware; See 1301	16
13.1-3	II/48492/US	II/48492/US	TRACK BAKE, CENTER TRUCK	Overhaul per HRM 1301 Section 3 & IPC Overhaul kit; Replace wear plates & associated hardware; See 1301	8
			HIDDEN DAMAGE ESTIMATE, ALL INVENTORY SPARES	Estimate for out of scope work	AR